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Europe/Latin America Report

SCIENCE AND TECHNOLOGY

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EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

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BIOTECHNOLOGY

/12223

GERMANY'S HOECHST EYES AUTOMOBILE MARKET

Brussels INDUSTRIE MAGAZINE in French Dec 86 pp 108-112

[Article signed Maxime: "Focusing on Automobiles"; first paragraph is INDUSTRIE MAGAZINE introduction]

[Text] Hoechst's guiding principle in plastics development: Expand automotive applications.

Maintaining, however, a realistic perspective: "Market expansion will probably be limited, but we believe that the demand for high tech materials will grow."

A disturbing development for European manufacturers: Exports to the Third World are expected to drop in the 1990's as these countries achieve greater autonomy. The situation will be further aggravated by the appearance of new manufacturing and export centers in Canada and the Middle East.

These developments necessitate restructuring of divisions specializing in general use plastics--polypropylene manufacture at BP [British Petroleum], low-density polyethylene at ICE [Imperial Chemical Industries, UK], and at Hoechst....

The future lies in the manufacture of high tech plastics, a field in which the West's high technology should ensure it a position of leadership.

In any event this is the option chosen by Hoechst, which is making a special R&D effort in high-performance thermoplastic polymers, such as polycarbonates and several fluorinated polymers.

Polyether Ketone

Among the new products introduced by Hoechst at K'86 [Kunststoffe '86, plastics trade fair] is an aromatic polyether ketone, with the generic name Hostatec.

This material with a crystalline structure exhibits excellent heat resistance (up to 250 degrees Celsius), good fire resistance without emitting toxic gases, and remarkable resistance to chemicals and humidity. Moreover, given

its excellent electrical insulating properties, this material will be used to insulate electrical cables. In addition, its chemical composition contains absolutely no halogens (chlorine or fluorine), thus making it a choice material for nuclear plants and for aircraft construction, i.e., in sectors where chlorine-caused corrosion can take on tragic proportions....

Another development is planned for polyether ketone: Through reinforcement with carbon fibers, a composite extremely resistant to breakage is produced. A new product awaiting new applications....

As for composites intended for automotive applications, Hoechst has shown a preference for polyacetals (Pa) and polypropylenes (Pp). Its goal is to integrate Pp parts into the metal body and into metal parts after incorporating glass fibers into the plastics. The linear expansion coefficient of this thermoplastic, 10 times greater than that of steel, is cut in half by the addition of these fibers. Without this reinforcement, serious positioning problems would arise when anchoring plastic parts in the metal frame. Audi and Volkswagen have already shown interest in the technique....

In fluoroplastics, we will see new applications, such as transparent films made with polymerized tetrafluoroethylene and ethylene (ETFE).

These films exhibit good resistance to extremes in temperature, consequently they have a long life in exterior applications (10 to 15 years). They are particularly interesting because of their optical properties. Film produced from this kind of polymer transmits sunlight, including ultraviolet a and b radiation--thus allowing one to tan at an indoor swimming pool, a dream which could become reality. Not to mention the bactericidal effect of ultraviolet radiation.... Practical applications for these revolutionary films include roofing installations for swimming pools, greenhouses, and fish breeding operations....

Another advantage of these fluorinated polymers is their electrical insulating properties, which make them applicable in the electronics industry. These insulating properties are independent of transmission frequency and operating temperature, and thus ideal polymers for insulating electrical cables, manufacturing capacitors, antenna microswitches....

Although few or no revolutionary products were introduced at K'86, one could see continued improvement in performance and production processes. High technology apparently remains the prerogative of Western manufacturers....

25054/13046
CSO: 3698/A066

DASSAULT OF FRANCE OUTLINES PARTICIPATION IN HERMES

Paris LES ECHOS in French 3 Dec 86 p 10

[Article by Gerard Muteaud: "The Hermes Budget Threatens to Swell"]

[Text] (From our correspondent) Serge Dassault, at Technospace, expressed his wish to see his company's name more systematically associated with the Hermes project; Dassault-Breguet is actually the delegated prime contractor for the European space plane. Under the direction of Philippe Amblard, 70 people are already working on the development of everything connected with the reentry of the shuttle into the atmosphere, and with its landing.

"We estimate that the studies necessary to define the final aerodynamic shape will take five years. It is therefore urgent that we precisely define the schedule of the Hermes program and the role played by each European partner."

The single certainty for the new CEO is that the initial budget of 15 billion francs might prove to be insufficient. This is a view which does not appear to be shared by the minister of finances, Edouard Balladur.

"You have to know what you want," says Serge Dassault. "As difficulties are being encountered, the Hermes budget inevitably threatens to swell."

For the time being Dassault is relying on the 88 million francs it received from CNES to pursue its space activities. A new Space Department with its own budget has just been created under the direction of Jean-Maurice Roubertie.

About ten persons in the department are studying the development of the future transportation plane for the European shuttle, and the construction of a Mercury 900 for tests and crew training. Also on the program is an extra-vehicular project for orbit interventions.

Serge Dassault however, has no illusions on the immediate employment spinoffs from the European program. "Two shuttles in ten years is not what will provide work for our Bordeaux or other plants." A brief statement, which must not have reassured the CGT workers who came to demonstrate their displeasure with the threat haunting 700 jobs at Merignac plant.

As for the Mirage built at the Aquitaine plants, Serge Dassault hopes to "have good news to announce by the beginning of next year."

DFVLR PLANS MICROGRAVITY RESEARCH CENTER IN COLOGNE

Duesseldorf VDI NACHRICHTEN in German No 39, 26 Sep 86 p 45

[Article by Wolfgang Engelhardt: "A Ground Control Center Facilitates Work in Orbiting Labs: MUSC Helps With Experiments and Manufacture in Space. A DFVLR Microgravity User Support Center will be built with DM200 million"; first paragraph is VDI NACHRICHTEN introduction]

[Text] VDI-N, Cologne, 09/26/86--Space experts have accepted it for a long time, but science and industry still have reservations about experiments and production methods in terrestrial orbit. The DFVLR (German Research and Experimental Institute for Aeronautics and Astronautics) in Cologne-Porz will construct a microgravity user support center to overcome this reservation and to provide practical support. The estimate of the construction and operational costs of this "Microgravity User Support Center" (MUSC) amounts to some DM200 million over the next 10 years.

The results of the first German Spacelab mission, which recently were presented in Norderney, show that the FRG has reached a leading international position in microgravity research. Both the scientific and practical results of the D-1 mission justify a further German commitment in this field, particularly with regard to European participation in the American space station. As the national space organization, the DFVLR has participated extensively in all German and many European satellite and space probe projects, and the five DFVLR research centers in the FRG will also be deeply involved in the preparation of future key space programs.

The MUSC project will provide support for scientific and industrial space users in planning and carrying out space experiments with the Spacelab, Eureca, and Columbus vehicles, which are or will be available in terrestrial orbit for days, months, or years. The most important work area will be supporting microgravity experiments in the specific fields of materials sciences, biology, and medicine.

On behalf of the interested parties, the MUSC experts are involved in the efficient preparation of planned experiments, in determining the best use of the precious time in space, and, finally, in the optimal evaluation of the measurement results obtained. The installations necessary for these purposes consist of ground models of the experimental space installations, a control room to monitor and control experiments during space flight, and a scientific and technical infrastructure to support the researcher.

For example, the preparation of a space experiment includes the following steps:

--drawing up a project through the definition of tasks, necessary installations, and expected objectives;
--preparation of human subjects for medical experiments;
--preparation and qualification of tests and materials;
--definition of experimental procedures and relevant necessary control programs;
--optimization of nondestructive testing methods;
--definition of requirements relevant to the space system, particularly concerning energy resources;
--training of astronaut-scientists and researchers;
--preparation of control experiments on earth.

The DFVLR already has provided support programs for the experiments of the first European Spacelab mission in the fall of 1983 and the D1 Mission at the end of 1985. Currently, the second German Spacelab mission is being prepared, as is the first Eureca mission, in which a pay load will operate automatically in terrestrial orbit for several months. In the middle of the 1990's, these preparations will shift to the utilization of the international space station, which features more stringent requirements in every respect and for which the new user support center is already preparing itself.

Scientific work in the space station will be very different from prior space activities since experiments will no longer take place in succession but in parallel. The nearly overlapping experimental time in space allows a continuous series of different process alternatives. After a rapid preliminary evaluation of the first results during the mission, the experiment may be optimized with the participation of the ground installations, and then repeated with new parameters.

The Control Room Establishes a Link Between the User and the Space Experiment

A precondition for such efficient scientific activity in space, in addition to suitable equipment for the space station, is a close meshing of scientific and technical preparation and optimization of experiments with operational activities, for example, monitoring and control of experiments during space operation.

The connection between the user on earth and the space experiment will be realized through a special control room in which the information coming from the space station--astronauts' reports, graphic representation of output data, video displays--will be transmitted and in which the user will have the opportunity to decide on the further course of his experiment and, wherever possible, to carry out related modifications and complete the experiment process. A prerequisite for this variable control of an experiment in real time, called "telescience" by the specialists, must be precise long-term planning of activities by the user and MUSC experts. This planning must includes for example, sufficient time for test variations and, of course, procedures for diagnossis of defects for correction of malfunctions.

The priorities of scientific support for space experiments in the user support center offer information as well as the use of the center's scientific

and technical infrastructure during preparation, performance, and evaluation of experiments. The MUSC, along with the research laboratories for materials science and biology experiments under reduced gravity (MATLAB and BIOLAB), form the "Center for Experiments Under Microgravity" (ZEUS) of the DFVLR center in Cologne.

The user support center will be organized so that scientific work can be carried out in the space station as in a large research installation comparable to a particle accelerator facility, a research nuclear reactor, or an astronomical observatory. MUSC installations will be available to interested parties from the FRG and member countries of the European Space Agency (ESA). The center offers to all interested parties relatively easy access to experimental space technology as well as reduced costs through efficient preparation and improved utilization of the expensive time in orbit.

Primarily, German industry, with the assistance of Hannover's Intospace company and of the MUSC, should be introduced to the interesting possibilities of utilizing space experiments; however, these installations are also available to interested foreign parties in exchange for reimbursement of relevant costs. For the next German Spacelab mission, there are already many more applications for experiments than available flight opportunities; in this connection, foreign countries have obviously identified their chances better than German companies, which certainly is related to the reduced American space flights after the Challenger catastrophe.

Norbert Kiehne, the deputy manager of the DFVLR astronautic section, discussed the time frame of the pending European space flight projects, which depend to a great extent on the American space shuttle: "One day the European and German space industry, with its own space station, will no longer depend on America's NASA. For the time being, we still depend on the space shuttle as a launch vehicle, particularly as regards the planned second German Spacelab mission, which will not be able to be launched before 1990, perhaps even 1991. The same applies to the unmanned experimental launch vehicle Eureca, for which numerous microgravity tests are likewise planned in order to prepare for work in the space station Columbus. We must also keep in mind that the European space station module will not be connected to the American space station until 1997."

Even Research Minister Dr Heinz Riesenhuber appeared impressed by the DFVLR's plans for the creation of a space user center for interested research and industry parties. He offered an attractive incentive to industry to take part in space experiments: "For the time being, it is not necessary for industries to pay all the expenses for space missions as long as their experiments are sufficiently interesting. The quality of scientific proposals is fundamental to answering all the decisive questions that will arise from the ingenious experiments of the expensive Spacelab missions."

8622/12951
CSO: 3698/M034

ESA, CNES ANNOUNCE HERMES SYSTEM CONTRACTORS, BUDGET

Paris LES ECHOS in French 5 Dec 86 p 2

[Unsigned article: "Preparatory Program Has Started"]

[Text] The planned financial framework of 48 million ecus (about 330 million francs) having been 70 percent subscribed, the Hermes preparatory program was started on 27 November, according to a CNES-ESA joint statement issued yesterday in Paris. "In fact, the total subscription exceeds 100 percent and the precise extent of each participating state's contribution will be determined very soon," the announcement specifies.

On this occasion, ESA also disclosed the industrial organization selected to carry out the preparatory program. In addition to the prime contracts awarded jointly to Aerospatiale and Dassault, the subsystems of the Hermes space plane were assigned to the following manufacturers:

Propulsion	MBB (FRG)
Operational electronics	MATRA (F)
On-board power	ETCA (B)
Fuel cells	Dornier (FRG)
Thermal reentry protection	AMD-BA (F)
Atmospheric guidance and piloting	AMD-BA (F)
Manipulator arm	Fokker (NL)
Thermal control	Aeritalia (I)
Environment control and life support	Dornier (FRG)
Data acquisition and communications	ANT (FRG)
On-board software	Aerospatiale (F)
Air lock	CASA and SENER (S)

ETCA - Technical Studies and Aerospace Constructions
AMD - Avions Marcel Dassault

No British firm is included in this list. England just announced--slightly late--that it would like to enrol into 5-10 percent of the program's work. But it has not been ruled out that a place might be made for British Aerospace in a subsequent phase of the program, even though a futuristic space plane program known as Hotol has long been supported across the Channel, and presented to ESA as a competitor to Hermes.

11,023
CSO: 3698/168

ESA APPROVES 1.5 BILLION ECU BUDGET FOR 1987

Paris AFP SCIENCES in French 18 Dec 86 pp 11-14

[Unsigned article: "ESA: 1.5 Billion ECU For 1987 Budget"]

[Excerpts] Paris--Space has a tailwind in Europe; an additional proof of this was just received through the adoption of the 1987 budget by the Council of the European Space Agency on 15 December.

This budget will amount to 1.5 billion ECU, for an increase of 300 million ECU over 1986, pointed out Reimar Lust, the agency's director general; this figure confirms the trend manifest since 1985 in the future of European aerospace industries, considering that the 1985 budget was only 1 billion ECU. Thanks to this, 300 new positions will be created in 1987 at ESA, added to the 200 hirings of this year.

The agency's personnel grew by up to 1450 people at the end of 1986, distributed between the ESA headquarters in Paris, ESTEC (European Center for Space Technology) at Noordwijk in the Netherlands, ESOC (European Center for Space Operations at Darmstadt in FRG, and ESRIN (European Center for Computer Research) at Frascati near Rome in Italy.

ESA's general budget for 1987 (in million ECU, with one ECU being worth 6.85 FF) is distributed as follows according to indications supplied by Mr Lust:

Operating budget	1,492
Mandatory and scientific programs	347
Ariane-5/Hermes program	362
Columbus program	195
Earth observation programs	180
Microgravity program	32
Telecommunications program	288
Scientific programs	169
Programs financed by third parties	88

The number of ESA member nations will grow from 11 to 13 on 1 January 1987 with the enrolment of Austria and Norway as full members, making a complete contribution to the agency's budget in accordance with their GNP. "The contributions of these two new members," points out Mr Lust, "will be added to the agency's budget. They will constitute 'extras' which we can always put to good use."

Austria's contribution is 5 million ECU, and Norway's 7 million. ESA also has two associated member nations, Canada and Finland. Mr Lust does not expect either of them to request full membership in the agency; Canada has shown no such intention until now. Responding to questions, the ESA general director did not appear favorably inclined toward a larger number of full member nations, pointing out that decisions would be increasingly difficult to reach as this number increases. "We must be very cautious in expanding the number of member nations for this reason," he added.

The major programs underway, Ariane-5/Hermes and Columbus, are proceeding normally in Europe. The same holds for the scientific programs (Hipparcus, Soho), the earth observation program (ERS-1, to be launched in 1989), and the telecommunications program Olympus (launch in 1988).

The ESA Council examined projects for long range programs, for the period extending past 1995-2000. They will be placed on the agenda of the Council of Ministers of ESA Member Nations scheduled for June, which will have to reach final decisions about the Ariane-5, Hermes, and Columbus programs; hence the importance of conducting ESA-NASA and intergovernmental negotiations on the space station.

Negotiations on the Space Station

During this press conference, Mr Lust and his aides did not conceal that the negotiations were "difficult, as complex as the system itself. We are far from having solved all the problems, but we have made progress. We have learned how to reach an understanding, and have found a common language. This language must be transmitted at all levels, all the way to the engineers... We are reasonably optimistic and believe that we will succeed."

At the same time, Mr Lust acknowledged that "the simple, by consensus, formula on which we all sides agreed for solving general questions, cannot be applied in all instances."

For instance, if modifications are made to the core of the station, and therefore to interfaces, a different approach and a different negotiation formula will have to be used. "This in fact will be the case in the distribution of European payloads, about which we must have our say, whether it is for the manned module Columbus, the Free-flyer, or the polar platform. We believe that we should be able to use Ariane-5 and Hermes to carry these loads to the station, and that this must be expressly stated in the agreement. The same is true for financing methods and operating costs."

"We, the Europeans, will have to have a voice in the matter of European payloads. We know that the manned module can only be carried by a shuttle, because only a shuttle can dock it to the station, but for the rest we must be able to use our European (Ariane-5) or Japanese (H-2) launching facilities."

The next American-European meeting about the station is planned for 19-23 January, said Mr Lust. The Americans will come to Paris; the negotiations will take place at the ESA headquarters. The beginning of the week will be reserved for intergovernmental negotiations to draft a Memorandum of Understanding (MOU), with ESA-NASA negotiations to be carried out during the end of the week.

"We hope to have an answer for the meeting of the ESA Council of Ministers in June," added Mr Lust, "but we do not want to hurry. We hope to stay on the schedule that has been set; I am an optimist. Since the two parties have decided to cooperate and must succeed in this cooperation, I am certain that we will obtain a solution to our problems. Both parties really want to achieve it."

Hermes Program Will Be Managed Directly by ESA

ESA will directly manage the Hermes program, Mr Lust said; the decision was taken at the 15 December meeting of the agency's council. This is a complex program that involves totally new technologies. The decision does not reconsider the designation of the industrial prime contractor, Aerospatiale in this case.

Dropping Hermes in favor of a more futuristic program such as the Hotol or Sanger projects is also out of the question now. "We must gain experience with Hermes for all problems involving the space plane; these are new technological developments. It would be a mistake to skip steps at this time. We are not smarter than the Americans."

"Hotol and Sanger require engines which do not yet exist. We will study them in parallel with the development of the Hermes program. But Hermes is one step, and a reasonable approach. We have this program and we must stay with it, while at the same time preparing the fully recoverable space plane of the post-1995 years. The development time for Hotol and Sanger will be very long. These are ships which will not be operational until long after the year 2000."

For the present financing of the Hermes studies, a single participation, that of Great Britain, which should reach 10 percent, is still not determined. It should be announced before Christmas.

NASA's Viewpoint

According to an ESA official, the expectations for an agreement between NASA and ESA on the orbital station project have "improved" following a negotiation session that just ended in Washington.

After several months of cross purpose talks, the Europeans feel that "real progress" has been made with their NASA counterparts, and that there now exists a "better mutual understanding," Ian Pryke, ESA's Washington representative indicated to AFP on 11 December.

Commenting on the discussions between ESA representatives and NASA members, Mr Pryke stated that they took place in a "cordial atmosphere." They covered the access to the future orbital station and the use of its scientific and commercial "capabilities." These two problems disturb the Europeans, and had threatened to sink the negotiations. "We have not reached an agreement, but the positions of each side are better understood," Mr Pryke added.

The design of the orbital station has not yet been "frozen," but an idea of its price, which is of the order of $10 billion, is emerging. Because it is the major fund provider, the United States want to have control over the definition and utilization conditions of this station, which will spin around the earth at an altitude of about 250 km. Some American circles are certainly tempted to enter into the deal by themselves if the foreign partners prove to be too demanding.

This point of view however, has very few chances of succeeding, observe specialists, given the financial magnitude of the program (NASA's annual budget is currently about $7.5 billion), and the fact that the United States cannot for too long allow the Soviets a monopoly on orbital stations.

11,023
CSO: 3698/179

ARIANE EXTENDED STAGE 'ARIES' FOR SPACE STATION SUPPLY

Stuttgart FLUG REVUE in German Dec 86 pp 19-20

[Article by Goetz Wange: "Ariane 5 Extended Stage--Cargo Transport Version--A Further Step Toward European Independence in Space: Aries, a Modified Extended Stage for Ariane 5, to Transport Heavy Loads to the Space Station]

[Text] A decision that finally is gradually being implemented in the U.S., over the astronauts' protests, has long been part of European space philosophy: the use of unmanned carriers to transport cargo into space. This concerns the assembly and supply of space stations in particular. In a joint study, engineers from Matra Espace and MBB-ERNO [Messerschmitt-Boelkow-Blohm/Entwicklungsring Nord (Northern Developmental Trust)] considered a concept in which the L5 extended stage of the new Ariane 5 rocket would be modified to perform this task. This solution would save on developmental costs and might close the gap in current progress toward European autonomy in space.

The modified extended stage is designated Aries (Ariane extended stage). The engineering goals were to take the L5 extended stage, which was designed to carry satellites weighing up to 5.5 metric tons into a geostationary transfer orbit, and add onto it for the cargo mission so that it would be able not only to provide intermediate power, but also to locate and home in on the space station flying at an altitude of 450 to 500 km.

For takeoff the unmanned space station module is installed as the payload in the nose cargo area of the Ariane 5 rocket, which with its 4.6-m diameter offers roughly the same capacity as the space shuttle. During the final phase of the ascent Aries remains solidly affixed to the module being transported, even after the payload fairing has been jettisoned. The vehicle is then able to supply its own power in orbit for up to 48 hours.

During this phase an array of batteries (lithium cells) weighing about 300 kg, mounted on Aries' payload adapter, continuously delivers 500 W of electrical power. This also powers the telemetry and command system by which contact with the ground is maintained via a data relay satellite. To keep heating by solar radiation during this phase as low as possible, the Aries-cargo combination rotates slowly on its longitudinal axis. This also helps stabilize the orbit.

An onboard S-band antenna enables Aries to pick up contact with the orbital maneuvering vehicle, which, once the configuration has reached the rendezvous orbit, is sent out from the space station to meet it and collect the cargo, i.e., the module. The six 300-N control jets that Aries has used during the misssion up to this point now remain passive. The pickup vehicle docks on the free side of the module, and as soon as the connection is made Aries breaks away. While the cargo is being transported to the space station, Aries completes its mission with a maneuver that takes it out of the rendezvous orbit.

If the space station is not provided with a pickup vehicle, the mission profile could be such that Aries brings the cargo to within a few meters of the space station's docking point. An onboard manipulator arm would then take over the final phase.

The procedure is more complex when Aries must deliver its cargo to the space station's docking point without outside help. In this case, CCD [without further identification] cameras might also be installed on the front side of the transported module facing the space station in order to monitor the final phase of the docking procedure. Aries would have to be equipped with four additional 300-N control jets installed around the payload adapter.

The basic version of Aries consitutes an added weight of roughly 600 kg, which reduces the maximum payload of the Ariane 5 transport to about 14 metric tons.

13114/9835
CSO: 3698/188

ESA PROPOSES 'OCTOPUS' ROBOT FOR USE WITH SPACE STATION

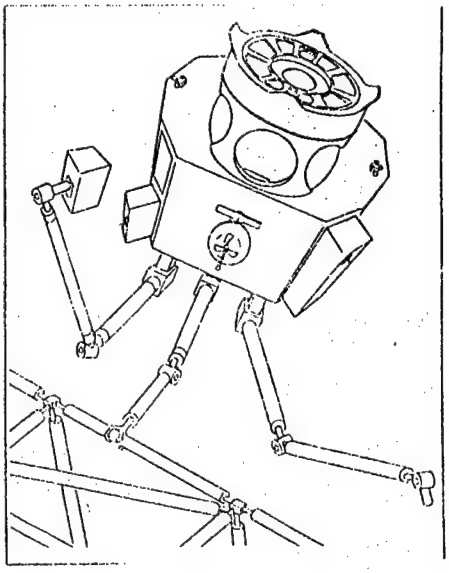
Stuttgart FLUG REVUE in German Dec 86 p 33

[Article by Goetz Wange: "Robots in Space--Everything in Hand--The Aptly Named 'Octopus' To Be Used for Loading and Unloading the Hermes Space Shuttle"]

[Text] Europeans working on the Columbus program are no longer solely considering the idea of a laboratory module permanently docked with the American space station. A European-manufactured small manned platform--in technical jargon, a man-tended free-flyer--will function largely independently of the space station. Supply operations would be handled by having a Hermes space shuttle that needed to take in resupply items from the loading bay dock with the platform. To minimize the amount of time astronauts would be required to work in their space suits to perform this servicing operation outside the pressure module a new procedure is being discussed: the use of a unit that would accommodate two astronauts something like a diving bell. Three remote-controlled robot arms would be operated from a control booth.

Meanwhile, the European Space Agency has issued an initial industry study on this vehicle, known as Octopus. The study was a joint effort by Airitalia, Dornier, Afremer and the Norwegian Industrial Research Center, conducted under the leadership of Aerospatiale. The proposed design offers a central body 2.15 m high and 1.5 m in diameter that could accommodate two astronauts while work was in progress. Visibility would be through three round observation windows 40 cm in diameter.

The robot vehicle would have three arms: Two could be equipped with tools to perform the servicing tasks or repairs, while the third would hold Octopus in a fixed position during the operation.



The Octopus robot has three manipulator arms for outside work.

The range of application of Hermes' onboard robot arm, which Fokker of the Netherlands will be developing under the project name HERA, could also be expanded with Octopus. HERA and Octopus could be locked together in "cherry-picker mode." In this phase Octopus would be maneuvered by the manipulator arm of the Hermes space shuttle during the operation.

Octopus is to be designed so that it can be transported to the orbiting European space station in Hermes' loading bay. The robot unit would be stationed in space until the next generation of such servicing robots is developed. The initial concepts for these generations have already been completed. These versions would also be able to service free-flying satellites at a given distance from the space station. During periods when the man-tended servicing unit was docked at the international space station, it could serve as a rescue section in the event of an accident or provide shelter for astronauts when another area of the space station was damaged.

13114/9835
CSO: 3698/188

10-YEAR EVOLUTION OF ITALIAN AEROSPACE

Naples L'AEROTECNICA MISSILI E SPAZIO in Italian Jun 85 pp 101-108

[Article by V. Losito, Accademia Aeronautica, Pozzuoli, and Istituto di Aerodinamica "Umberto Nobile", University of Naples; and E. Esposito, Aeritalia S.A.I.p.a.- Marketing and Market Analysis, Naples]

[Text] Summary

This report identifies some significant aspects of the evolution of Italian aerospace industry.

The first part evaluates the degree of development of aerospace industry relative to the national economy and the degree of expansion of each subsector.

The second part evaluates the technological level of the sector, the degree of oligopoly of the major producing countries, and determines a relationship between the index of oligopoly and the market share of each country.

Lastly, the report examines the four main subsectors (combat aircraft, commercial transport aircraft, helicopters, and engines) determining for each of them, the degree of production diversification.

1. Introduction

For years the authors have been focusing their interest in the analysis and the "measuring" of the economic evolution of the aerospace industry by means of static and dynamic models (1), (2), (3), (4).

These studies permitted the formulation of a forecasting scheme for the development of Italian aerospace industry during the next ten years (5), (6).

The first part of this work presents updated data (to the end of 1983) on total receipts and personnel of the major producing countries.

The evolution of Italian aerospace industry is described in terms of total receipts, and the indices of export, import, and balance of payments. Personnel variation was evaluated separately for four compartments: aerodyne, equipment, engines, and space.

The study has measured the degree of development of aerospace industry relative to the national economy, and the degree of growth of each compartment.

The second part evaluates the technological level of the industry under the assumption of a direct relationship between research and development expenditures and the rate of innovation. The degree of oligopoly of the major producing countries was then calculated and a close correlation was obtained between it and the market share of each country.

Finally, four main subsectors were examined (combat aircraft, commercial transport aircraft, helicopters, and engines), and for each of them, the degree of production diversification was determined.

2. Evolution of Italian aerospace industry during the last ten years.

The aerospace industry, a division of the manufacturing industry, is characterized by a high degree of technological innovation. Production is concentrated in the highly industrialized countries which also have considerable financial resources (2).

The production cycle is of international dimensions because it has to absorb the technological risk and the cost of programs, and guarantee a wide potential market for the product. This last consideration is certainly not negligible if one wanted to assure the project rapid achievement of positive economic returns.

The Italian aeronautical industry participates in this sector with a variety of its own products and through close ties with American companies (Boeing, McDonnell Douglas, Pratt & Whitney, General Electric, etc.) and with EC companies (Aerospatiale, M.B.B., M.T.U., British Aerospace, Rolls Royce, etc.).

Therefore, an analysis of the Italian aerospace industry cannot be conducted without considering its pertinent international aspects.

Tables 1 and 2 show the percentage growth of personnel and total receipts for the major producing countries, during the period 1970- 1982.

Evident is the growth of Italian industry in terms of employees (1.7 percent in 1970 and 2.3 percent in 1982) and total receipts (0.8 percent in 1970 and 2 percent in 1982).

The EC has increased its total share of the world market (14.9 percent in 1970 to 33.2 percent in 1980). In contrast, in the last two-year period, the total receipts of the EC have undergone a decrease (33.2 percent in 1980 to 29.1 percent in 1982) while the American industry consolidates its share of the market (60.1 percent in 1980 to 62.7 percent in 1982).

The economic transition of the first years of the 1980's has had a clear, consistent effect on the aerospace industry. The increased receipts of some EC countries in local currency (constant or indexed) was completely reabsorbed by the continued increase of the value of the dollar (5), (6). On the other hand, the behavior of the exchange rate facilitated the entrance on the market of marginal products or products that had become marginal. All this happens while the politics of high interest rates channels the flow of huge capital toward the USA, creating conditions for large investments, particularly in the area of high technology and emerging technology. That is, right in those phases of production which require interface between aerospace industry and modern electronics, and which will certainly influence the design and construction of future generation aircraft.

It is clear, from Tables 1 and 2, that the economic crisis had differing effects-- often in opposite directions-- on the aerospace industry. The country that seems to have suffered the most

Table 1. Percentage growth of personnel.

1 PAESE	1970	1975	1980	1981	1982
2 B	0.3	0.3	0.4	0.4	0.4
3 D	3.4	3.5	3.6	3.9	3.7
4 F	6.2	7.3	6.2	6.2	6.3
5 I	1.7	2.1	2.1	2.3	2.3
6 NL	0.5	0.5	0.5	0.5	0.5
7 UK	14.1	15.6	12.6	12.1	11.7
8 CEE	26.2	29.3	25.4	25.4	24.9
9 USA	66.9	63.0	65.3	65.4	65.8
10 C	2.2	1.8	2.6	2.4	2.3
11 J	1.5	1.8	1.4	1.5	1.6
12 RDM	3.2	4.1	5.3	5.3	5.4
13 MONDO	100.0	100.0	100.0	100.0	100.0
14 FONTE: BIBL. [5]					

Key: 1. Country
2. Belgium
3. FRG
4. France
5. Italy
6. Holland
7. United Kingdom
8. EC
9. United States of America
10. Canada
11. Japan
12. Rest of the world
13. World
14. Source: Bibl.(5)

Table 2. Percentage growth of total receipts in the aerospace industry (1970-1982)

Tab. 2 – Evoluzione % del fatturato finale settore aerospaziale (1970-1982)

PAESE	1970	1975	1980	1981	1982
B	0.2	0.4	0.6	0.5	0.5
D	2.9	4.4	5.2	5.7	5.7
F	4.8	10.1	12.0	9.8	9.1
I	0.8	1.7	2.0	1.9	2.0
NL	0.4	0.8	0.8	0.6	0.6
UK	5.8	10.0	12.6	10.7	11.2
CEE	14.9	27.4	33.2	29.2	29.1
USA	80.4	65.9	60.1	63.9	62.7
C	1.8	2.1	2.1	2.5	3.0
J	1.1	2.3	1.6	1.5	2.2
RDM	1.8	2.3	3.0	2.9	3.0
MONDO	100.0	100.0	100.0	100.0	100.0
FONTE: BIBL. [5]					

Key: see Table 1 key.

from the changes of the 1980-82 period is France (12 percent of the share of the market in 1980 against 9.1 percent in 1982), and in less measure Great Britain (12.6 percent in 1980 against 11.2 percent in 1982).

The Italian aeronautical industry has reacted well to the effects of the economic transition. Tables 3 and 4 show the growth of total receipts, exports, imports, and personnel, by compartment, in the period 1973-83. Relevant features are the gradual increase of employees (30,000 in 1973 to 42,500 in 1983) and the growth of the commercial balance defined as

balance = (export - import)/(export + import)

To make a thorough analysis of the Italian aerospace industry, we need to introduce simple but important non-dimensional indices.

A first "characteristic number" measures the degree of development of aerospace industry in a country compared to industrialized nations

$$A_i = \frac{F_{ai}/PNL_i}{F_{aw}/PNL_w}$$

in which the symbols are defined as follows:

F_{ai} = aerospace receipts of country i

F_{aw} = aerospace receipts of OECD area

PNL_i = gross national product of country i

PNL_w = gross national product of OECD area

Thus, the country being examined has an aerospace industry more (or less) developed relative to the OECD countries according to whether A is >1 or <1.

As it is seen from the values for A shown in Table 5, the Italian aerospace industry shows a low development index (A = 0.30-0.42) for the entire period 1972-1983. In other words, in spite of the absolute growth previously shown, development compared to the

Table 3. Italian aerospace industry- billion lire (current).

1	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83(*)
FATT. GLOBALE	280	360	460	600	740	900	1120	1500	2200	2900	3540
2 ESPORTAZ.	135	190	245	300	330	430	565	900	1550	1900	2010
3 IMPORTAZ.	65	110	178	165	205	220	340	485	605	690	630
4 SALDO (%)	35.0	26.7	15.8	29.0	23.4	32.3	24.9	30.0	43.9	46.7	52.3
5 FONTE: BIBL. [8]											
6 (*) Nostra Stima											

Key: 1. Total receipts 2. Exports 3. Imports
4. Balance 5. Source: bibl(8) 6. Our estimate

Table 4. Number of employees in Italian aerospace industry: distribution and growth.

	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83(*)
1 AERODINE	18000	19200	19300	19500	20700	22700	24053	24750	25370	25300
2 PROPULS.	5100	5100	5300	5400	5600	5800	6268	6300	6230	6200
3 EQUIPAG.	6100	6000	6000	7100	7200	7300	7529	7560	7600	7600
4 SPAZIO	800	1200	1400	2450	2500	2700	2850	3360	3400	3400
5 TOTALE	30000	31500	32000	34500	36000	38500	40700	42000	42600	42500
6 FONTE: BIBL. [8]										
7 (*) Nostra Stima										

Key: 1. Aerodyne 2. Propulsion 3. Equipment 4. Space
5. Total 6. Source: bibl.(8) 7. Our estimate

Table 5. Index of degree of relative development for the aeronautical industry

	1972-74	1975-77	1978-80	1981-83
1 ITALIA	.30	.36	.37	.42
2 CEE	.72	.84	.85	.96
USA	1.75	1.71	1.80	1.62
3 Nostra elaborazione su fonte: da [8] a [21]				

Key: 1. Italy 2. EC 3. Our calculation from (8) to (21).

OECD area has been very restrained, and the difference relative to the USA and the EC has remained high.

During the time span analyzed, the EC aerospace industry shows growth (A = 0.76-0.96), while relative development for the USA undergoes a slight decrease (A = 1.75-1.62).

It's necessary to go into the details of the individual compartments of the Italian aerospace industry to gain a more complete picture of its evolution.

3. Analysis of the growth of compartments

A measure of the degree of development of the single compartments (propulsion, aerodyne, equipment, and space) is given by a second characteristic number defined as

$$B_{ij} = \frac{F_{ij}/F_{ai}}{F_{jw}/F_{aw}}$$

where the terms are as previously defined and in addition:

F_{ij} = receipts for country i, compartment j

F_{jw} = receipts for compartment j, OECD area

Compartment j of country i shows more (or less) development within the aerospace industry and compared to the OECD area depending on whether $B > 1$ or < 1.

The index was calculated for each of the four compartments indicated above and the results are shown in Tables 6, 7, 8, and 9.

Italian aerospace industry is characterized by a well developed aerodyne compartment (B = 1.29-1.39) relative to the equipment compartment (B = 0.92-0.68), and space (B = 0.29-0.20). This shows a pattern in Italian aerospace industry quite different than that of the EC and the USA.

Table 6. Index of relative development of the aerodyne compartment.

	1975-77	1978-80	1981-83
ITALIA	1.29	1.38	1.39
CEE	1.20	1.13	1.06
USA	.96	1.00	.95
Nostra elaborazione su fonte: da [8] a [18]			

Table 7. Index of relative development of the space compartment.

	1975-77	1978-80	1981-83
ITALIA	.29	.18	.20
CEE	.19	.17	.23
USA	1.45	1.15	1.44
Nostra elaborazione su fonte: da [8] a [18]			

Table 8. Index of relative development of the equipment compartment.

	1975-77	1978-80	1981-83
ITALIA	.92	.79	.68
CEE	1.07	1.21	1.14
USA	1.02	.99	.95
Nostra elaborazione su fonte: da [8] a [18]			

Table 9. Index of relative development of the propulsion compartment.

	1975-77	1978-80	1981-83
ITALIA	1.10	.94	.92
CEE	1.30	1.20	1.20
USA	1.18	1.10	1.10
Nostra elaborazione su fonte: da [8] a [18]			

Table 10. Index of technological level of the aerospace industry.

	1975-77	1978-80	1981-83
ITALIA	9.4	9.2	12.5
CEE	21.0	20.0	18.0
USA	24.0	22.0	22.2
Nostra elaborazione su fonte: da [8] a [17]			

Key for Tables 6-10: 1. Italy
2. EC
3. Our calculation from sources (8) to (18) in bibliography
4. Our calculation from sources (8) to (17) in in bibliography

4. Technological level of the aerospace industry

The theory of the "life cycle of a product" stipulates that industrialized nations continuously increase spending on research and development. But in reality, a growing portion of this spending goes toward high technology industries. There is continuous introduction of new products into the market and rapid obsolescence of existing products with a decrease of their average life.

A measurement of the degree of technological innovation in aerospace products is, therefore, a necessary and indispensable means for determining characteristics and potentials of national industries.

Postponing to a future phase an indepth, detailed study on the subject, we limit ourselves here on indicating three principal aspects:
1) the technological level of the country;
2) the technological difference between countries;
3) changes with time.

For an analysis of these three aspects, two different methods can be pursued. The first method would involve concentrating on the product, describing its characteristics, the degree of complexity, and the level of innovation. This approach is particularly lengthy and difficult, and tied to subjective evaluations and specific judgements. A second way of proceeding consists in evaluating directly the technological level of the sector by hypothesizing a direct correlation between research expenditures and development.

We preferred this second method because of the results already obtained (2), and its greater simplicity and objectivity.

For the purpose, we define as "index of technological level" the ratio

$$ILT_i = \frac{(R\&S)_i}{F_{ai}}$$

where (R&S) refers to aerospace research and expenditures of country i.

Data relative to the three aspects indicated above are shown in Table 10.

Italy shows a rather low index of technological level (ILT = 9.4-12.5) relative to the EC (ILT = 21-28) and the USA (ILT = 24-22.2). Although the gap has been diminishing in the 1975-83 period, it has remained rather consistent: "the technological level of Italy in the aerospace sector is about 69 percent that of the EC and 55 percent that of the USA".

It is necessary, in the short term, to narrow the sector technological gap by increasing research expenditures, especially in a period of foreseeable greater investments in the USA and EC.

5. Level of oligopoly in the industry

The aerospace market is a typical oligopoly in which the few participating companies cannot formulate a strategy without considering the reaction of rival companies. Consequently, in developing their marketing plans, every company has to consider not only the present market situation but also possible countermeasures by the competition.

Analyses of oligopolies have long been conducted in economic studies, but the specialized aeronautical literature does not show an investigation on a market of oligopoly in the sector. Such an analysis is important because it can furnish valid support to company policy and can be useful for a new national strategy in the sector.

In this respect, we have, first of all, introduced an index which measures the degree of oligopoly in each country

$$Y_i = \frac{F_{3si}}{F_{ai}}$$

with the numerator representing the sum of the receipts of the first three companies of country i.

To avoid the effects of year-to-year variations, the index was calculated as a mean value of a number of years (three) that show significance.

We then introduced another index X which measures the market quota for each country

$$Xi = \frac{F_{ai}}{F_{aw}}$$

where the terms are as previously defined.

The data base we prepared allowed us to calculate the values of $Y = Y(X)$ for various countries, as shown in Figure 1.

The one parameter regression of these data yields an interpolating function of the type

$$Y = 0.8932\ e^{-1.6808X}$$

All the countries fall in the proximity of the correlation curve except for Italy and Japan. Figure 1 shows that as the market quota increases the degree of oligopoly decreases, that is, the number of companies in the sector increases.

Italy and Japan are located far below the correlation curve. To approach the curve, there should be a sustained increase in the world market quota and/or proceed toward regrouping more national companies so as to increase the index of oligopoly.

Obviously, a mere vertical movement bringing Italy close to Canada's level, would not resolve expansion problems. Similarly, an horizontal movement, implying a market quota index near that of the EC total, does not seem achievable. It is more realistic to visualize an oblique movement which would have Italy achieve a position nearer that of the EC countries and next to the position occupied by West Germany in Figure 1.

6. Degree of production diversification in the aeronautical industry

To measure the degree of production diversification we have divided the aeronautical industry into four subsectors: helicopters, commercial transport aircraft, combat aircraft, and engines.

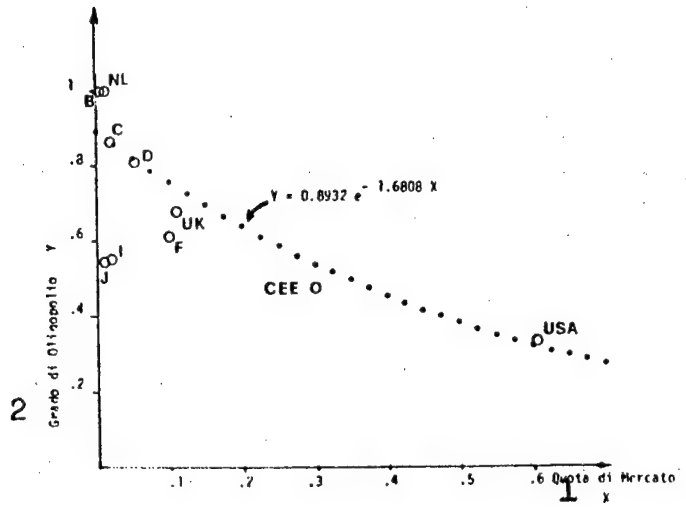


Figure 1

Key: 1. Market share
2. Degree of oligopoly
B Belgium
C Canada
CEE EC
D FRG
F France
I Italy
J Japan
NL Holland
USA USA
UK United Kingdom

Table 11. Aeronautical industry- classification by classes of products for each individual subsector.

1 COMPARTO	2 FASCE							
3 Velivoli da Combattimento	AS2	AS1	FGA	GA2	GA1	T2	T1	TE
4 Velivoli da Trasporto	J3	J2	J1	TP2	TP1	AP	--	--
5 Elicotteri	EA	EM	ET	EL	--	--	--	--
6 Propulsori	TFM	TFC	TJ	TS	TP	P	--	--

Key: 1. Subsector
2. Classes
3. Combat aircraft
4. Commercial transport aircraft
5. Helicopters
6. Engines

For each of these subsectors we have identified various classes of products, so as to be able to insert in the various classes types of aircraft with homogeneous technical and functional characteristics (Tables 11 and 12).

We then proceede to insert in each subsector and in the specific class all the aircraft produced by each country, whether entirely produced by one country, or in cooperation with another, or in advanced development stage.

The index of production diversification of a subsector was then calculated as

$$E_{ij} = \frac{1}{M_j} \sum_{k=1}^{M_j} \frac{1}{N_{kj}} n_{kij}$$

in which the terms are defined as follows:

$$N_{kj} = \sum_{i} n_{kij}$$

E(i,j) = index of diversification of subsector j, country i

M(j) = number of classes of subsector j

n(k,j,i) = number of types of products of country i in the k class of subsector j

N(k,j) = total of all products in k class of subsector j.

The index so constructed, assumes always positive values between zero and one.

E(i,j) approaches unity as the number of types of products of country i in subsector j increases (Table 13).

Italy has the highest index of diversification in the combat aircraft subsector (E = 0.12) and helicopters (E = 0.11), with lower values in the engines and commercial transport aircraft (E = 0.04).

Table 12. Classification nomenclature used in Table 11 for the analysis of production diversification

AP = Piston aircraft
TP1 = Turboprop <20 seats
TP2 = Turboprop >20 seats
J1 = Jet < 20 seats
J2 = Jet <100 seats
J3 = Jet >100 seats
TE = Trainer turboprop
T1 = Trainer level I
T2 = Trainer level II
GA1 = Ground attack level I
GA2 = Ground attack level II
FGA = Fighter-ground attack
AS1 = Air superiority level I
AS2 = Air superiority level II
EL = Light helicopter
ET = Transport helicopter
EM = Multipurpose helicopter
EA = Attack helicopter
P = Piston motor
TP = Turboprop
TS = Turboshaft
TJ = Turbojet
TFL = Civil turbofan
TFM = Military turbofan

Table 13. Index of production diversification

	1 Velivoli da Combattimento	2 Elicotteri	3 Velivoli da Trasporto	4 Propulsori
USA	.40	.46	.32	.44
I	.12	.11	.04	.04
UK	.12	.11	.16	.16
F	.16	.19	.11	.16
D	.06	.08	.02	.06
NL	.00	.00	.05	.00
C	.00	.03	.08	.08
J	.06	.03	.03	.04

5 Nostra elaborazione su fonte: BIBL. [17]

(see Figure 1 key for country codes)

Key: 1. Combat aircraft 2. Helicopters 3. Transport aircraft
4. Engines 5. Our calculation from source (17)

The degree of production diversification in the US industry is very high, with a minimum value in commercial transport aircraft ($E = 0.32$), and a maximum value in helicopters ($E = 0.46$).

The level of production diversification of Canada is rather low in each of the four subsectors ($E < 0.08$); the same is true for Japan ($E < 0.06$).

Conspicuous within the EC are the industries of Great Britain ($E = 0.11$-0.16) and France ($E = 0.11$-0.19), while Germany's level turns out quite low ($E < 0.08$), and is especially low for Holland ($E = 0.05$ for transport aircraft and $E = 0.0$ for the other subsectors).

7. Conclusion

We have described the evolution of Italian aerospace industry during the last ten years.

It was shown that the development of the industry has been rather consistent (the market share for Italy increased from 0.8 percent in 1970 to 2 percent in 1982), the number of employees increased from 30,000 in 1974 to 42,500 in 1983, and there has been a noticeable increase in the commercial balance (+35 percent in 1973 to +53 percent in 1983).

Nevertheless, this development when compared to the OECD area, appears more restrained ($A = 0.3$ in the 1972-74 period, and $A = 0.42$ in the 1980-83 period), and the differential development index has remained high relative to the EC ($A = 0.72$ in 1972-74, $A = 0.96$ in the 1980-83 period), and relative to the US ($A = 1.75$ in 1972-74, $A = 1.62$ in 1980-83).

Calculations of the index of degree of development for each compartment (propulsion, aerodyne, equipment, and space) show the differential growth of Italian industry: more developed in the aerodyne subsector ($B = 1.29$-1.39), of limited dimensions in propulsion ($B = 1.1$-0.92), with a negative trend in equipment ($B = 0.92$-0.68), and with low values for space ($B = 0.29$-0.20).

The technological level, as measured by the ratio of expenditures on research and development and receipts from the sector, is also modest (the technology index for Italy is about 69 percent that of the EC and 55 percent that of the US).

It is therefore necessary to increase research and development in order to reduce, in the short and medium term, the technology gap with the major producing countries.

The analysis has determined a close relationship between the level of oligopoly and the market quota of each country. Italy (with Japan) shows quite an anomalous behavior relative to these two variables. To achieve a position nearer the EC countries, and utilize the indispensable external economic forces, Italy should simultaneously increase the level of oligopoly and the market quota so as to achieve a position next to West Germany.

We finally calculated the index of production diversification for each subsector of the aeronautical industry (combat aircraft, commercial transport aircraft, helicopters, and engines). The values of these indices for Italy are lower than for the US, France, and Great Britain; and higher--except for the engine subsector--than FRG.

In any event, the index for Italy is higher in the combat aircraft and helicopter subsectors (E = 0.12) and lower in the commercial transport and engine subsectors (E = 0.04).

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MORE AUTOMATION, PRODUCTIVITY SOUGHT BY NEW RENAULT CHIEF

Paris L'USINE NOUVELLE in French 18-25 Dec 86 pp 4-8

[Articles by Georges LeGall, "Renault: Levy's Mission"; Marie-Jeanne Pasquette, "The Infernal Debt"; and Michel Defaux and Philippe Escande, "Quality in Place of Automation"]

[Text] It took a month, to the day, following the disappearance of Georges Besse, for the Cabinet to name his successor: Raymond Levy, chairman of the board of Cockerill for the past 18 months. Alain Madelin did not think it was all that long, even if the profile of the man they sought made it a most difficult task, but it was an unexpected delay. It was necessary to negotiate every step of the way with the Belgian Government, shocked at being presented with a fait accompli when Levy had signed a 5-year contract with Cockerill. Levy's departure for Renault was therefore delayed for several days. It was an inexplicable delay. The new president of Renault will have the task of completing the recovery of a group of 180,000 persons whose financial situation is dangerous and worrisome. An exciting challenge, without a doubt, but one which few persons would have sufficient background to face. The fact is that the job which Jacques Chirac's government has entrusted to Raymond Levy is even more difficult than the one which the government of Laurent Fabius gave to Georges Besse: "You must get Renault on its feet, but relying more on your own efforts and less on your shareholder," several government ministers told Levy.

Physically quite different from Besse, whose carriage was impressive, Levy nevertheless has much in common with his predecessor: the same age: 59; the same background: the Polytechnical and Mining School, but a master's from MIT for Levy. A comparable career that has essentially taken place in the energy sector, with Levy choosing oil (ELF-ERAP [Gasoline and Lubricants Company of France-Petroleum Prospecting and Activities Enterprise]), while Besse chose the nuclear field. Next came the direction of metallurgical enterprises in trouble: Levy at Usinor and Besse at Pechiney. Finally, entry into a world previously foreign to them: the automobile industry.

Will Levy apply the same policy as his predecessor at Renault? Taking over at Renault in January 1985, Besse found a disastrous situation: 12.6 billion francs in losses in 1984 for a turnover of 118 billion. A budget in the red. If Renault had not been a national firm, it would have had to file for bankruptcy. Moreover, this is the problem now facing its subsidiary, Renault

Industrial Vehicles (RVI), which falls under commercial law. This is the first urgent matter that Levy will have to resolve immediately. Between now and 31 December, RVI must rebuild its capital to avoid failure. The solution will undoubtedly combine a reappraisal of RVI assets, a contribution of shares from the American heavy builder Mack, in which Renault took out 42 percent of the shares, and the injection of fresh capital.

In 22 months, Besse did not perform a miracle. Renault's financial status still makes one dizzy. But the hole is not so deep. Losses for 1986 will be around 5 billion francs. Breaking down Renault's turnover (excluding financial subsidiaries), passenger cars account for 80 percent, heavy-weight vehicles 15 percent and other industrial activities only 5 percent.

It is therefore in the automobile sector itself that the recovery had to take place. Failing to bring out new models in time, Renault's penetration of the French market, which absorbs half of its total sales, dropped from 39 percent in 1982 to 29 percent in 1985. This collapse mainly explains the firm's debacles. It was thanks to the models designed by Bernard Hanon but out too late (R5 and R25 in 1984, the R21 in 1986) that the recovery began in 1986, with a penetration of 31 percent, which was Besse's goal. Nor must one sell at a loss. In 1983, when world production reached a record of 2.07 million vehicles, Renault recorded a deficit of 1.6 billion francs.

Besse had the talent and courage to gain acceptance for a new idea in Billancourt: Profitability must win out over volume. A company the size of Renault cannot recover overnight. In 1985, the number of employees went from 98,000 to 86,000, but productivity has not varied because production has continued to decline. On the other hand, the trend reversed in 1986, with a new drop in the number of employed (77,000 wage earners at the end of the year) combining with a resumption of production.

And yet, employment is not the only field on which Besse has left his mark. For 1985-1986 as a whole, while accepting the consequence of a modest commercial improvement, sales prices rose by 12 percent. At the same time, purchase prices rose only 3 percent, with a harsher selection on the part of suppliers, whose number is now only 1,250 compared with 1,400 at the end of 1985. At Renault as well as RVI, it is a time for austerity.

Besse ran out of sources of losses: shutdown of the Mexico plant, a halt in Formula 1 competition. He has sold off assets: Renix electronics, Volvo shares, Micmo cycles, April programmable automation, real estate and land, including in the sensitive Boulogne-Billancourt area, but without threatening the firm's bases. Or the RVI heavy construction or the American penetration with American Motors, whose burden was nevertheless improved thanks to the vehicle assembly contract with Chrysler.

He would not have changed strategies in 1987. The program remained the improvement in productivity, implying more layoffs, with personnel to be reduced to 71,000 at Renault and around 170,000 for the entire firm. The declared objective was a return to financial equilibrium by the fourth quarter.

For his first year, it is little likely that Levy could do better. Apparently, the prospect of a return to profit in 1988 is satisfactory after the "bloodletting" of the preceding period. But the latter leaves traces in the form of an intolerable debt. In order not to make it worse, Besse reduced investments to 6 billion francs in 1986, compared with 8.3 billion in 1985 and 9.9 billion in 1984. At the same time, he tried to protect the future: Layoffs spared the research department. New models are planned and the first new vehicle will come out in 1988 to replace the R9-R11's.

Even if return to the private sector is not on the agenda, rebuilding capital is a problem that cannot be avoided. Otherwise, Renault's long-term future will be grave. Confronted with the PSA, which has now come out of its crisis, as the rise of Peugeot on the Stock Market emphasizes. And also confronting the foreign competitors: Volkswagen has announced a 100-billion-franc investment plan between 1987 and 1991!

The international environment is changing and it contains surprises, such as the difficulties of the world leader, General Motors, which must face up to the lack of interest in its models in the United States, or those of Toyota, the No 1 company in Japan and No 3 in the world, which will cut its investments by 8 percent in 1987 because of the drop in profits brought about by the rise of the yen. This must not mask the fact that competition is stiffer and stiffer. The strongest are growing even stronger: Volkswagen has taken control of the Spanish Seat and Fiat has taken over Alfa Romeo. Alliances are being formed: Volkswagen with Ford in Brazil and Argentina. They are making better use of their international setups: Volkswagen will ship cars from Brazil to the United States at prices enabling them to fight the Japanese, but the Korean and Yugoslav models as well. Fiat plans to build a small model in Poland that it will sell in West Europe.

To date, the French have been little involved in such major international maneuvers. However, Peugeot and Fiat are cooperating on automobile assembly in Argentina and the building of small utilitarian models in Europe. Will Levy get Renault to take the step? There are possibilities in Europe, with Ford, for example, which in vain sought cooperation with Fiat for passenger cars. It could have led to the manufacture of common components. In the United States, American Motors is in a good position on the 4 X 4 market with its Jeeps, but its future seems difficult to guarantee for passenger cars with only the Renault models.

The face of heavy industry is rapidly changing. In North America, General Motors accepts the preponderance of Volvo for trucks over 15 tons in the joint company in which the Swedish firm will have 76-percent control. In Europe, General Motors has given up making trucks and Ford has practically yielded to Fiat-Iveco. Renault Industrial Vehicles can scarcely remain isolated. Lacking a European partner, it could find a range to share with the Japanese, who are still practically absent from the European heavy market.

In a country like France, which continues to limit Japanese cars to 3 percent of the market, an agreement of this type would be a revolution. But is the

policy of a nationalist autarchy tenable when competition is worldwide? Bull has just taken the step with NEC. Why not Renault?

Levy has a solid reputation as a reorganizer. At ELF and then Usinor, he certainly rebuilt, but mainly redeployed activities while adapting to the evolutions he anticipated. Besse rechanneled the firm to mobilize men better and offer a smaller target in case of trouble. Levy could turn out to be the man of international alliances for Renault.

Infernal Indebtedness

How can Renault get out of the vicious cycle: undercapitalization-indebtedness-overwhelming financial costs-deficit, in which it has found itself for the past 3 years? Like Georges Besse, his successor, Raymond Levy, will now have to solve the same puzzle. The former president of Renault had already done the impossible: halting the national company's growth of colossal debts (60 billion francs), despite a negative self-financing capacity at the end of 1985 of 7 billion francs.

Even before investing 5.2 billion in order to continue the launching of the Renault 21, Besse had to fill in the hole left by the poor results of 1984 and 1985 (over 23 billion). This year, he reckoned on a smaller loss: 5 to 6 billion francs, almost the level of Renault's financial costs in 1986.

Those are the stakes. If the car builder should achieve a sounder financial situation, the drop in interest charges would allow one to glimpse prospects of positive results in the long run. What will happen in 1987? Reducing the amount of indebtedness, failing to have adequate self-financing, necessarily depends on massive contributions from the government's own funds. In the Ministry of Industry as at Renault, no one denies that 20 billion francs are needed.

The figure can be broken down as follows: 15 billion solely to rebuild the net assets, meaning to absorb the cumulative losses of the national firm, and 5 billion to give the firm a barely decent level of funds. For it is not even a matter of guaranteeing Renault a sound financial structure: 5 billion in capital compared with a debt in the neighborhood of 40 billion is still enough to make many financial analysts shudder.

But even that scenario is unlikely. As persuasive as Levy can be, there is little chance that he could change the attitude of the government concerning the capital endowment. We know that Alain Madelin has asked Booz Allen for a report on Renault's financial needs. We also know the Ministry of Finance's aversion for any subsidy. It barely included 6.5 billion francs in the budget for Renault, iron and steel and Cdf Chemistry, an amount that some think is an eighth of real needs!

The new chairman of the board of Renault will therefore probably have no choice. It is thanks to the same endless effort as that made by his predecessor that he will succeed or fail in getting Renault out of difficulty.

Employment Trend at Renault

Layoffs will continue and only some 71,000 employees will be left at the state-owned firm by the end of 1987.

Renault Total: 98,153 on 31 December 1984
81,311 on 30 September 1986

	Flins	Billan. Indus. Center	Sandou-ville	Douai	Cleon	LeMans	Billan. Corp. Hdqtrs.	Ruel-Malm. Consult.	Com. Network	Misc.
1/12/84	16,110	16,612	9,619	8,190	9,064	8,593	6,527	5,969	14,063	5,486
30/9/86	13,362	12,915	8,554	7,407	7,210	6,231	4,854	3,889	11,279	4,830

Reducing financial costs by means of a more dynamic management of loans; taking advantage of a more favorable situation for the automobile industry to increase sales and break even; increasing productivity while getting rid of excess personnel; surrendering certain profitable branches and therefore interesting a potential buyer: These are all formulas that may pay off in the long run.

And, at the end of the tunnel: enough room to maneuver to invest 6.7 billion in 1987, perhaps more in 1988 and thus remain in the running.

Quality in the Absence of Automation

Nearly 11 vehicles manufactured per person per year in 1985; 13.7 this year and a target of 15 for 1987, an increase of which Renault is proud, but that must be relativized. The target set for next year corresponds to the results of the best European figures obtained in 1986 (Ford and GM Europe). But the latter do not intend to stand idly by! Furthermore, the Americans, with the Alpha (Ford), Liberty (Chrysler) and Saturn (GM) projects, even viewing projections negatively, and the Japanese are planning fierce competition. Mazda announced 19.3 vehicles per man per year in 1975 and 37 in 1979. Today, the figure is 48 vehicles (with, it is true, a larger share of subcontracting).

The reduction in investments at Renault in 1985 and 1986 can only widen the gap. The major lines of development (simplification of vehicle design, reduction in time between planning and the market, automation of final assembly) presume large investments: CAO-CFAO, tri-axle stamping presses, robots, vision, production management, organization, quality, without forgetting the crucial item of training.

For case welding by points, all builders are at about the same level. Only the Sandouville plant, which produces the R25's and the R21's, has not been completely automated at that level. It is in the final assembly that the state-owned firm is the most behind. According to engineers at Kuka, which supplies a large share of the robots in the German automobile industry, the French builders are reportedly from 2 to 3 years behind in this field. The situation is illustrated by the pools of robots now employed: Renault

announces 600 machines, while Volkswagen, Ford and Fiat, the most advanced in Europe, each have over 1,200 units. There is also a delay for communications in the plant by industrial systems. GM intends to cable five plants by using the standard MAP by the beginning of 1987. For its part, Renault plans a pilot program at Flins, but no industrial application is foreseen before 1988-1989.

The situation is not rose-colored on the tails side. There remains the face side: immaterial investments, the most important one being quality. It is a trump card but one difficult to play, especially since the Boulogne firm starts far back with nonquality costs in the billions (8 percent of the turnover in 1984).

Following the failure of the experiment with quality clubs in 1979, management set up a "continuous quality improvement program" in 1983. The goal: to mobilize the entire company around quality. First phase: training the general management at all plants. Starting at the top, working teams were set up at all hierarchical levels. A total of 20 million francs were invested in 1986 to train in quality, four times more than in 1984.

Industrial Investments (in millions of francs)

Production Units (investments linked to a new vehicle)	1984	1985	1986
Billancourt (utilitarian Express)	517	269	
Flins (Super 5)	896		136
LeMans (gear wheel trains, suspension)	738	435	141
Sandouville (R25 and R21)	416	673	133
Case tools (cannot be assigned to particular plant)	215	759	248
Other units	1,478	1,094	632
Total Investments	4,260	3,230	1,290

Sandouville, the most advanced plant in this field, is about to become a "participatory enterprise." Nearly 2,500 persons are involved in 400 work teams. Moreover, participation is also open to suppliers. Thus, for the launching of the R21, equipment suppliers and maintenance specialists met 2 years before the launching to define needs, find new solutions and work as long as possible on the reliability of the machines. Results: reliability rates at launching previously unknown in the firm and an exceptional increase in speed. In less than 7 weeks, the plant produced over 800 cars a day. As for stock, it went from 6.5 days in 1985 to 4.5 days this year and should reach 3.8 days by next year, while the average at the state-owned firm was 10.6 days.

Another encouraging sign: the quality index of the R21 (lot of cars inspected in detail) far beyond objectives: 136 over the past 3 months, while the "0 faults" reached 160. As for the R25, it is now at about 140.

On the whole, the state-owned company has a rate of 138, while the long-term objective is to reach 145 (the best, Mercedes, is 150). But action must be

fast and the example of Sandouville must be rapidly spread, because German competitors such as Volkswagen have similar results. The same is true for the number of cars coming out without flaws at the end of the assembly line. The best rate today is 85 percent (also at Sandouville), while the target is 95 percent in 3 years. Post-sales costs dropped 35 percent between 1985 and 1986.

Unable to pass the others in automation, Renault is basing all its hopes on the in-depth modification of the culture and management of the company. The Japanese, relatively little automated, succeeded along those lines. It is one reason why Renault can still hope.

11,464
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FIAT SEEKS PROFITS IN TELECOMMUNICATIONS, BIOTECHNOLOGY

Paris LE MONDE in French 27 Jan 87 pp 39-40

[Article by Claire Blandin: "Fiat or Power Regained"]

[Excerpts] Fiat buying out Alfa Romeo, Fiat in "Star Wars," Fiat investing in Westland helicopters, Fait dealing with Ford on an equal footing: The 1986 album for industry contains picture after picture of the regained power of the Turin firm.

The 18th-ranking company in Europe, it approached a turnover of 150 billion francs in 1986. Its profits doubled from 1984 to 1985, exceeding 6 billion francs. It has not been in debt 1 lira since the end of last year and takes in billions of dollars on the major international financial markets. At the end of 1986, its capitalization on the stock market was equivalent to its turnover.

Well-Protected Domain

It has a jealously guarded market. The Japanese have the right to only 2,000 imports a year. Nor does Fiat hesitate to drive out intruders with its aggressive price policy. Renault paid the price in 1986 (the French car fell to 8.7 percent of sales on the peninsula) for having dared to exceed 10 percent of the Italian market the preceding year, thanks to the R5, which Agnelli claims was dirt cheap. "The best (free) publicity that Fiat could make for us," Georges Besse, chairman of the board of Renault, said at the time.

Fiat, which has retreated to its national base -- in 1980, the Italian firm gave up its Spanish subsidiary Seat, which had a chronic deficit -- has been lucky enough to be relatively unaffected by the European recession in its own territory. In 1984, when automobile sales dropped by 2.5 percent, they rose by 3.5 percent in Italy.

But fortunately for the company, Fiat is not limited to automobiles. While the latter industry piles up deficits, other sectors, some of which have a marginal turnover, nevertheless continue to make enough profits to enable the firm to remain in the red.

In four of these sectors, Fiat has carved out a juicy spot. Iveco, after 10 years of effort, is now a firm of European dimensions in the heavyweight division, the only one able to achieve the status, alongside the German Mercedes. Out of the red in 1985, it is strengthening its position by taking over Ford's British activities in the sector in 1986.

In the field of public works equipment and machinery, Fiatallis is the only European firm able to compete with the Americans and the Japanese. Fiat has consolidated its position by buying out the shares of its partner, the American Allis Chalmers, in Fiatallis.

Farm tractors are enjoying the same success, with Fiatagri capering ahead of the other Europeans. Finally, machine tools and the Comau production systems have moved out front, to the point that the latter subsidiary is working 70-percent independently of Fiat and has the American General Motors and Digital Equipment for partners.

"Star Wars"

Although smaller, a few other branches are developing: Telettra telecommunications, Sorin bio-engineering, Fiat Aviazione aeronautics and the Thermomecanica nuclear power plant.

These are the firms offering the most promising growth and the highest profits, without counting their possible fallout on the automobile industry. It is also these companies that are apt to take part in President Reagan's "Star Wars" and the race for new technologies of which Fiat dreams. At a time when its rivals, General Motors, Ford or Daimler Benz are plunging into these state-of-the-art sectors: aeronautics, space, data processing, Fiat can now invest massively to consolidate those it already owns.

The fact is that since 1985, the firm has resumed its march forward. The period of recovery is over, even if the modernization of its plants remains a continuing phenomenon. Backed by its self-financing capabilities (10 percent of turnover in 1985) and on the capital collected on the Stock Exchange, the firm plans a substantial investment program: 10 trillion lire between now and 1989 (nearly 50 billion francs).

This does not count the 5 trillion lire (25 billion francs) that Fiat is ready to devote to the reorganization of Alfa Romeo. As for research, it represents 2.5 to 3 percent of the turnover annually.

Few companies have such means to put in the service of their ambitions. And yet, despite its power, Fiat has agreed to take up the challenge of the reorganization of Alfa Romeo. Naturally, the takeover of this builder will give the Turin firm additional production capacities at a time when the success of the Uno is saturating the planned facilities. Naturally also, Fiat will strengthen its position at the top of the range where Alfa, merged with Lancia, will represent a fourth of that segment in Europe, not far from Mercedes.

Previously oriented toward the domestic market. Fiat will now use that position to expand abroad, in Europe, but also and above all in the United States. The Italian builder had for some time been thinking about an American comeback on the only market profitable for a European company without a local base: the so-called "luxury imports," where the Germans or Scandinavians have a spectacular record. Fiat could have bet on the Lancia, but it will return to American territory with Alfa, which has a good image there thanks to its sports cars.

Eclectic Firm

	Turnover (%)	Personnel (%)	Investments (%)
Automobiles	47.1	44.2	52.9
Industrial vehicles	17.7	15.4	8.2
Farm tractors	7	5	4.6
Public works equipment, machinery	3.1	2.6	3
Metallurgical products	3.2	5	3.8
Components	10.9	16.4	13.3
Production systems and means	2.4	2	1
Civil engineering	1.2	1.5	1.5
Railroad products and systems	0.5	0.6	0.4
Aviation	1.5	0.2	3.5
Thermomechanics	0.6	0.7	0.1
Telecommunications	1.6	2.2	2.2
Bioengineering	0.5	0.5	0.7
Publishing	0.7	0.7	0.8
Tourism and transportation	0.9	1.3	2
Misc.	1.1	1.7	2
Total	30,561 billion lire	226,222 persons	1,433 billion lire

(1 lira = .005 franc)

The goals are ambitious: 620,000 cars for all of Alfa-Lancia by about 1990, 60,000 of them in the United States, with an industrial tool now competitive and regained profitability. For its own recovery, the firm has proved that it could emerge from the most difficult situations, but the stakes are more than industrial.

By taking up the Alfa problem, by agreeing to deal with personnel problems, by coveting exports on a large scale once again, Fiat accepts in a way to gamble its past success. The Turin firm is aware of the risk, a risk it seeks to limit by taking for Alfa Romeo the same team that ensured the recovery of Fiat. But, they modestly say at 10 Corso Marconi, headquarters of the group, "that is an assurance of experience, not of success."

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FRANCE, EC LEGISLATE GENETIC ENGINEERING, PHARMACEUTICAL PATENTS

France Bans Embryo Research for 3 Years

Paris LE MONDE in French 16 Dec 86 pp 1, 12

[Article by Jean-Yves Nau; first paragraph is LE MONDE introduction]

[Text] Inaugurating the National Ethics Advisory Board's annual colloquy, which began on Monday 15 December, Mrs Barzach, minister delegate in charge of health and family affairs, approved the Board's essential recommendations and particularly as regards a 3-year ban on research in genetic manipulation of the human embryo. Mr Mitterrand was to comment on this subject later in the afternoon.

When the very future of the human species is at stake, not everything is permissible in the name of medical and scientific research. It becomes important, then, to know when to halt so as to be better able to gauge the consequences of one's action.

This, in essence, is the conclusion reached in the important opinion made public by the National Ethics Board presided by Professor Jean Bernard--an opinion that has been a long time in the forming, and whose wording one can easily imagine was not arrived at without giving rise to serious internal debates among the members of the Board.

For, although there is general agreement today among a majority as to the pressing need to establish "guardrails" in this domain, a consensus as to the type of regulation to be put in place is proving more difficult to arrive at.

At the center of the debates is the human embryo. The possibility of obtaining it in vitro (outside the feminine genital environment), and of preserving it indefinitely, or almost so by, freezing raises once again today the question of its status. By May 1984, the National Ethics Board had already postulated that the human embryo should "be recognized as a potential person," this characterization constituting "the basis of the respect due it." Today, the Board maintains this position (although the term "the potentiality of a person" may still be preferred by some), unequivocally reaffirming that this statement must be understood "as the enunciation of an ethical concept." In

view of the present uncertainties as to the status of the embryo relative to "the threshold point of emergence of the human person," the Board maintains, with complete consistency, that it is from the moment of fertilization that the principle of respect for the human-being-to-be must be invoked.

At the same time, it finds that the development of procreation by in vitro fertilization "accentuates the trend towards reducing the human body to the status of instruments." In the Board's view, "The new fact, for which society still does not have a response, is that in differentiating between stages in the process of reproduction the new techniques compel the interest of the patient, that of the potential parents, and that of the future child, to be each considered separately."

The question arises as to how to respond to the legitimate desire of sterile couples to have children, without, on the other hand, hindering the indispensable research work that tomorrow will yield the best therapeutic response, and without reducing the human embryo to a mere "research object?" This is the difficult question to which the National Board has addressed its effort. The "group of the wise men," headed by Professor Jean Bernard, bases its view on several cardinal givens, such as the informing of the persons concerned, the obtaining of their "free and informed" consent, and the obtaining of the "renouncing of profit," considering, in his view, that gametes and human embryos cannot be made the objects of any commerce whatever.

Urgency of a Law

As a whole, the legislation being advocated appears coherent. In vitro fertilization must be made a therapy for sterility (with the notion of "hypofertility" being dealt with explicitly), and not a procedure enabling fertile couples--or fertile individuals--to procreate without incurring sexual relations.

Furthermore, the differentiation it makes between authorized research, forbidden research, and research to be subjected to a moratorium, also lends itself to the clarifying of an increasingly complicated situation.

The decision to call for a 3-year moratorium attests to the fear, on the part of a majority of the National Ethics Board's members, that these techniques will be dissociated from their intent as therapies for sterility and used as tools of eugenics. The Board knows that it will be criticized for having taken this position. In its view, neither the increased rate of success with FIVETE (in vitro fertilization and transfer of embryo) nor early detection of grave pathology can justify the pursuit of research on the genetic diagnosis of the embryo prior to transplantation. The sole acceptable approach, in the Board's view, is diagnosis in the fetal stage (by amniocentesis) and therapeutic abortion that may result from it. One point must nevertheless be clarified: Why is it necessary to confront the moral problem of therapeutic abortion of a fetus when the abortion could be performed on the embryo in vitro--the selfsame embryo, moreover, which can be used for scientific research?

This moratorium reflects the Board's concern as to the effectiveness of the followup action to be accorded its recommendations. "It would be a useless exercise," explains Professor Jean Bernard, "if the recommendations formulated in this opinion were not applied in their entirety."

This attests to the urgency of legislation to regulate these activities in their entirety and of approving the centers that will be authorized in the future to use these techniques of medically-assisted procreation. Only regulatory legislation such as this, which is backed by the present minister of health, can ensure that the National Ethics Board's soundly-based conclusions will be translated into action.

Mitterrand Comments

Paris LE MONDE in French 17 Dec 86 p 17

[Article by Franck Nouchi: "AIDS Epidemic Must Not Threaten Freedoms"]

[Excerpts] In the solemn setting of the Sorbonne's great amphitheater, on the occasion of the Annual Colloquy on Ethics, the president of the Republic evoked officially for the first time, on Monday 15 December, the AIDS epidemic.

The rest of the speech delivered by the president of the Republic before a large audience of notables including Mrs Alliot-Marie and Mrs Simone Veil (Mrs Barzach, minister of health, was, at the time, attending the voting in the Senate on the reinstatement of the private hospital-care sector), was devoted to procreation and research on the human embryo. "Modern science is rushing past the human being," said Mr Mitterrand, pointing out that "certain researchers themselves have, in good conscience, advocated a stopping of research as soon as it touches on manipulation of the human being." Referring to Jacques Testart, "who has chosen to decline participation in this sector of research, which aims at bringing about a radical change in the human being," Mr Mitterrand pointed out that, very soon, "it will be possible to determine very early whether the infant-to-be is a boy or a girl. This new know-how will lead to a new demand: A choice of the sex of one's child. Must this be permitted?"

The preserving of frozen embryos, the actual genetic mapping of the individual, and genetic manipulation of the highest sophistication, said Mr Mitterrand, "are all techniques that assail what was thought to be unchangeable in the human being." On all these issues, the president of the Republic emphasized the wisdom of public opinion that confines "the use of artificial procreation solely to therapeutic ends and refuses to manipulate the human being to enable the choosing of the sex of a child."

In Praise of the Board

Prior to these remarks on bioethics, the president of the Republic had visited, in the afternoon, two procreational medical and research centers: the Antoine-Beclere Maternity Hospital at Clamart and the Bicetre Hospital's CECOS.

These two visits enabled Mr Mitterrand to manifest symbolically his interest in these issues. At Antoine-Beclere, Professors Papiernik, Frydman and Testart explained to him the fundamental principles of in vitro fertilization, before introducing him to two sterile couples who had had children thanks to this technique. At Bicetre Hospital, Professors David and Schwartz gave the president of the Republic a particularly pointed presentation on the various aspects of insemination with donors and on the "CECOS system." Mitterrand listened attentively, then was introduced to a couple in which the husband, struck by a grave illness, had his sperm frozen before starting treatment. Thus, the chemotherapy did not prevent him from having two children.

At the conclusion of these proceedings devoted to the new methods of procreation, Mr Mitterrand expressed words of praise for the members of the National Ethics Board: "More than ever, we have need of you. The faster the world turns, the more intensive is the effort to acquire new powers, hence the greater the need to take the time to think about the consequences."

EC Law on Pharmaceutical Patents

Paris AFP SCIENCES in French 4 Dec 86 p 47

[Text] Brussels--It has been announced officially that on 1 December, at Brussels, the European Community enacted a number of measures to facilitate the commercialization and legal protection of pharmaceuticals within the EC, particularly those issuing from biotechnology.

The regulatory measures, passed by the ministers in charge of the internal market of the 12 member nations, are intended to contribute to the creation of a parmaceuticals common market. They provide for according a long period of protection to innovative firms, to enable them to industrialize the results of research efforts, which are often costly.

The new legislation sets an obligatory period of 6 years, effective throughout the EC and for most pharmaceuticals, during which a patent remains in force prior to entering the public domain. This period is lengthened to 10 years, however, for so-called "high-technology" pharmaceuticals, particularly those derived from the bio-industry or manufactured in space.

Concurrently, it institutes mutual recognition of testing. A pharmaceutical product authorized in one member country will thus be approved in the other 11 member countries. The repeating, on animals or human beings, of tests the results of which are already known, will be considered unacceptable, in effect, by the EC, from the ethical standpoint.

A preliminary Community-wide consultation will be organized prior to reaching any national decision to authorize, deny or withdraw a high-technology parmaceutical.

Spain opposed this package of measures, fearing invasion of her market by foreign pharmaceuticals groups. She finally agreed to it after the EC Commission assured her that the rules of free competition within the Community would be strictly applied in this domain to avoid abuse of dominant positions, according to EC sources.

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BRIEFS

ESPRIT KRITIC PROJECT--The task of ESPRIT research project No 387, KRITIC, is the research into the possible application of artificial intelligence (AI) to industrial control systems. The four European partners Krupp Atlas, British Telecom, Framentec, and the Queen Mary College of the University of London have been working together on this project for one year. Half of the total costs of DM9 million over a 3-year period is financed by the EC ESPRIT research program. KRITIC examines the possibility of applying, for example, expert systems to the control and maintenance of complex industrial systems. Examples of application would include energy supply grids or digital telephone exchanges. Such systems are always advantageous when the knowledge to be transferred to a computer program is virtually impossible to structure mathematically but is based more on associations of observable phenomena rather than on the understanding of the physical processes of these phenomena. KRITIC will describe these processes in a qualitative way to facilitate development of even more efficient expert systems. As the magazine MARKT UND TECHNIK (No. 34/86) reports, Krupp Atlas Electronik GmbH expects new impulses from KRITIC for the introduction of future technologies into its data processing systems. British Telecom hopes to use it for the control and maintenance of telephone exchanges as well as for telphone networks. Furthermore, the software firm Framentec, which specializes in artifical intelligence, and Queen Mary College hope to get valuable impulses from the project results. [Text] [Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German No 438, 28 Aug 86 p 11] 8629/9738

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ASEA OF SWEDEN DEVELOPS FASTER, STRONGER IRB 2000

Paris INDUSTRIES & TECHNIQUES in French 10 Dec 86 pp 121-122

[Article by Michel Alberganti: "A Faster and Stronger Arm"]

[Text] It moves at 3 m/s for a 10 kg payload. Its maintenance is reduced. Design advantages: modularity, cabling integrated in arm, backswing, AC motor.

Recent robot developments have been primarily concerned with peripherals (grippers, various sensors, and so on) or motors. No action in the mechanical arena, and it could have seemed that multi-articulated arms had reached their final configuration; but that would have been wrong! It would have overlooked the creativity of one of the latest non-Japanese robot manufacturers, Asea. After inventing a surprising structure with the swinging arm, the Swedish company has taken another look at the basic architecture of its own arms, reexamining the mechanical design of the famous IRB 6, whose career started in 1973. Today, 4000 of them are in operation throughout the world, and everyone recognizes their orange color; their five axes with 6 kg payloads have set a standard.

But on 29 September 1986, Asea sacrificed its idol: the IRB 2000 was born. It remains orange, but everything is different under the paint: 10 kg payload, six axes, AC motors, and especially, a modular and standardized mechanical structure, total integration of electrical wiring in the arm, and clearly improved acceleration and speed performances, not to mention a modernized and more reliable control. The result is that both mechanical and electronic maintenance tend to be nil. A major improvement for robots, tools that retained a reputation of being fragile. Their not very industrial design turned maintenance into a delicate operation.

In this essential respect, the IRB 2000 seems to have taken a decisive step. The arm assembly consists of only eight elements, three of which are absolutely identical: they are the gearboxes of axes 1 and 2. Since the latter is doubly supported, the two drive systems are not only alike, but also interchangeable. The only difference in the axis 1 gearbox is its cowling, which becomes a part of the robot's stand. Each of the boxes contains about five liters of oil; no oil changes are necessary, only level corrections. The

other axes of the robot are driven by equally standardized motor/gearbox assemblies, of which there are only two models. This modularity is of considerable help in maintenance. The same is true for the total integration of electrical cabling in the arm; the wires are cut into sections, and spiral cable covers prevent twists which could lead to breakages. The replacement process has been thoroughly studied: it requires no more than 15 minutes for any section. All these features do not change the basic structure of the robot, which continues to be an articulated rectangle. Here again, we find an innovation in the IRB 2000: the arm can swing back to reach an object placed behind it, thus eliminating a 180o rotation. In addition, the arm's reach has been increased to 1.54 m. It remains true that this robot is not adapted to work at two stations by swinging: its working space in the rear position is very small, and all it can do is pick up an object and move it to the front; base rotation remains a prerequisite for two-station operation. But in a suspended position, its work volume is valuable. In any case, this is a mechanical feat: a rectangular robot with a backswing. Not an obvious possibility. But Asea feels that this structure guarantees the best speed and horizontal motion performances, features which are also closely associated with motors and control systems. On the IRB 2000 Asea adopted AC motors, thus following a trend noted at the Robot 10 show. Compared to conventional DC motors, AC powered ones are more reliable. Asea has sought to perfect their operation by constantly measuring moments of inertia, with feedback to the control system for optimization of the arm's displacement rate at every moment. The result is a 30 percent gain in maximum speed, which reaches 3 m/s, and a 5-10 percent improvement in cycle time. The same concern for reliability and maintenance reduction can be detected in the control center. The use of LSI electronic circuits in the new S3 rack has cut down the eight control/command cards of the S2 rack to a single one. Similarly, six cards instead of 12 are enough to simultaneously control 12 axes. An absolute position measurement assures automatic motion resumption from a stopping point, safety functions have been doubled, and trouble diagnostics have been included. From a safety standpoint, the IRB 2000 wrist articulation has a new system patented by Asea, in which two additional gears have been inserted between the gears that connect the motor to the wrist. The first, spring mounted, detects overloads caused by an impact, and instantaneously stops the motion; the second takes up play to eliminate all maintenance for the life of the robot. Another modification is that 28 holes have been provided on the robot for attaching welding equipment for instance. According to Asea, the IRB 2000 is the first robot designed to be fabricated at minimum cost, which is why the announced price of 500 kF (compared to 360-380 kF for the IRB 6) comes as a surprise. The company explains that development costs were significant, with 65 MF having been devoted to this robot in 1985, not counting the 40 MF allocated to R&D for the IRB 3000 (30 kg payload), a model which should be unveiled soon by the Swedish company. Sale of the IRB 2000 should start in France in April 1987, with a projection of 20 units for the year. In five to six years it is possible that it will totally replace its famous older brother, the IRB 6.

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BRIEFS

SIEMENS OPTICAL COMPONENTS FACTORY--The Siemens company is already at the leading edge in the fiber optics field. Moreover, it is showing rapid promise of obtaining a substantial market share and of being one of the leading firms of the 1990's. In order to reach this goal, work has begun on an optical components factory, the first stone of which was laid last January in Berlin. Production of optical components presupposes high technology know-how in microelectronics, miniaturization, and automation and Siemens has designed the new factory with this in mind. Thus, just as for chip production, it is also necessary in this case to create extremely clean environmental conditions. In fact, even in the construction phase, the high mechanical precision and the restricted levels of tolerance require special precautions to eliminate all forms of vibration in certain production areas. On the basis of current trends, [Siemens foresees] the production of devices [at this factory] that are capable of relay switching, coupling, and shunting optical signals (generated by crystals) through electrical current. For the construction and start-up of this new factory, Siemens has invested DM114 million and another DM114 million are envisaged for the second phase. Further investments of similar amounts for research and development in this sector will be undertaken by Siemens in the future. The world market for optical components currently shows an annual growth of 35 percent and experts believe that it will amount to roughly DM3.5 billion in the early 1990's. Despite growing market saturation, an annual growth of at least 20 percent is forecast. [Excerpt] [Milan AUTONAZIONE E STRUMENTAZIONE in Italian No 12, Dec 86 p 82] 8615

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THOMSON LAYOFFS IN MILITARY ELECTRONICS BRANCH

Paris LES ECHOS in French 28 Nov 86 p 19

[Unsigned article: "Thomson-CSF: 585 Jobs Eliminated in 'Detection' Branch"]

[Text] At the three sessions of the establishment committees (one yesterday at Bagneux and two others today at Meudon and Sartrouville), Thomson CSF's management will announce that by 31 December 1988, 585 jobs will be eliminated in its Detection, Control, and Communication Systems (SDC) branch, which was newly created during the recent reorganization of the group's structure.

This decision, which affects military electronics, will lead to a 12 percent reduction in the personnel of the branch. It would appear to be motivated by an order book which at the beginning of 1986 was smaller than the initial forecasts. At first, incentive measures will be instituted until March 1987. Two centers, at Toulouse and Rouen, will not be affected; the latter, which currently employs 120 people, will actually grow to 150 employees in 1988.

This decision is the first concrete measure taken less than one month after Thomson CSF's management had informed the CE (establishment committee) of an company-wide overstaffing of 900-1000 employees in its aeronautics and defense branch, without specifying which jobs would be affected, and just after Alain Gomez had confirmed a tentative profit of 2 billion francs in 1986.

Lastly, in a statement, the unions expressed themselves against the management's intent to decentralize salary negotiations to 12 different locations, which according to them is aimed at "destroying the social policy" which existed during the general branch-wide negotiations.

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DIRECTOR OF FRANCE'S ANVAR ON 1987 INNOVATION FUNDING

Paris INDUSTRIES & TECHNIQUES in French 10 Dec 86 pp 35-36

[Unsigned interview with Christian Marbach, director general of ANVAR (National Association for the Implementation of Research): "The New ANVAR is here"]

[Text] Aid to innovation? 1987 will be a record year for PMI (small and medium-sized enterprises). Creation of technology enterprises? We will push the limits. Economic-financial backing for innovation projects? Available more than ever. After some hesitation, ANVAR bounces back.

The liberal tidal wave did not spare ANVAR. So much the better: reappraisals are always beneficial. But being Latins, we find it somewhat difficult to respect the strict rules which normally apply to objective Anglo-Saxon-style audits. In this case, admissible criticism has been voiced, but unfortunately combined with doubtful polemic. Heads seem to be cooler now; the baby was not thrown out with the bath water. Better yet, a new ANVAR is taking shape. "In terms of financial and human resources, the 1987 ANVAR is nearly the 1983 ANVAR, but with significantly greater experience," points out its president and director general, Christian Marbach. "With all that we have learned, we can do much better. The FIM (Industrial Modernization Fund) [eliminated in 1986] episode was particularly fruitful."

[Question] Yes, but it has been totally eliminated.

[Answer] Don't forget that FIM's true end will come in 1997, when all the loans that were advanced will be fully repaid. But formally, it is difficult to say otherwise. I hope that the enterprises which want to modernize will find the funds they need elsewhere and under equally good conditions. The attitude and understanding of the banking world on this matter is primordial for the future. For our part, we are at its service. FIM has brought us closer to this world, which I believe now appreciates our expertise. I would like to be able to develop this collaboration, preferably on an institutional basis: discussions are underway with the French Banking Association. FIM has also definitely taught us that innovation in one sector is, at least as much as anything else, the way to manufacture new products.

[Question] Will you therefore control Aid to Innovation?

[Answer] We want to provide better support for an enterprise's total innovation project, which implies an overall balance between technology, industrial implementation, commercial implementation, and so on, in other words to develop an actual economic-financial engineering.

[Question] Here again, your means have been limited.

[Answer] It is true that we will have a little less money in 1987 than in 1986. But we also count on repayments from enterprises we have aided in previous years and which have succeeded. This resource is currently far from negligible: a minimum of 250 MF for a total 1987 figure of 820-830 MF. As a whole, we estimate that we receive back one franc for every two francs of aid; two out of every three cases are successes. But we were especially criticized for the money allocated to large enterprises. Henceforth the keywords are PMI and regional decisions. From these two standpoints 1987 will be a record year.

[Question] You also spoke of "true" innovations.

[Answer] The 1992 products are being prepared today. Business leaders must think in terms of world markets, in terms of products that will stand up in the international arena. We have the means to help them in such evaluations.

We already offer innovation diagnostics and make experts available for various lengths of time. We now expect to emphasize our role as catalyst, as an interface between technology requestors and technology suppliers, namely those who do or are in a position to master technology, such as laboratories as well as large and small enterprises.

[Question] Do you have a sufficiently good knowledge of the market?

[Answer] We are not the source of information in this regard. But there is no lack of experts who keep technological and economic watch in enterprises, agencies, or ARIST (Regional Agency for Scientific and Technical Information) groups. We could play a more active role, and it's food for thought.

[Question] You also expect to work overtime in the creation of technological enterprises.

[Answer] Absolutely, and this task is a direct result of what we have been doing. In 1986 we participated closely or from a distance in about one hundred true creations. That's not enough. I might point out the agreements reached with ANCE (National Agency for Enterprise Creation). In addition, we are developing our cooperation with the risk capital world, which now exists in France. In particular, we are striving to encourage an investor-researcher dialogue; joint studies under our sponsorship are proceeding on a half-dozen files. And I also note the growing number of unplanned candidates for regional creations.

This is a recent development which I welcome. A whole movement is forming around technological centers and regional enterprise groups, and our contacts with them are not sufficiently strong.

[Question] You are also going to take over part of the support activities of the Computer Industry Agency.

[Answer] That's being considered, notably in the area of innovative sector systems. About 40 files are now ready, but everything will depend on budget decisions.

[Question] It is said that you are not indifferent to the "hidden treasures" of Defense.

[Answer] For the time being this is rethorical.

State aid for industrial research shows a tendency to drop; military research on the other hand is on the upswing. I make no judgements. It offers talents, means, and technological know-how which could interest enterprises in the civilian sector, but technical obstacles would have to be surmounted. What is especially needed is political planning. That's not my bailiwick; ask Mr Giraud.

[Question] The Inova exhibit however, is your bailiwick.

[Answer] It will take place 21-25 April 1987 at Cite des Sciences et de l'Industrie in Paris. It will be a show of "services" in the service of innovation.

It will also be continued with a two-day meeting on the management of technological resources in enterprises, and on the enterprise-innovation-state balance.

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DIRECTOR OF FRANCE'S CNRS SEEKS MORE TIES TO INDUSTRY

Paris INDUSTRIES & TECHNIQUES in French 10 Dec 86 pp 36-37

[Unsigned interview with Serge Feneuille, director general of CNRS: "CNRS, A Good Product for Manufacturers"]

[Text] Director general of CNRS this year and former scientific and technical director of the Lafarge-Coppee group, Serge Feneuille, wants to develop a CNRS-industry collaboration. But he does not rely on a regulatory position; he favors concrete and decentralized actions in the field. There is no shortage of ideas and talent, he says.

[Question] You have recently said that "there is no hidden treasure at CNRS for manufacturers." Doesn't this contradict the accepted views?

[Answer] Do not put words in my mouth. There is no hidden treasure at CNRS, in the sense that a manufacturer must not expect to find in some laboratory corner a "ready made" product or process which he then would only have to place in production. It's possible of course, and I could name a few famous examples in experimental chemistry or pharmaceuticals, but they will always remain exceptional. On the other hand, another treasure does exist, and it can be found in men and their talents. French enterprises could make better use of this potential.

[Question] Are there any good examples?

[Answer] Yes there are. And I am interested in moving away from abstract discussions to rely on what works. About ten joint CNRS-industry laboratories have been started in recent years. They work very well. Take the case of the Lyons Institute for Catalysis Research, which has created joint teams of researchers and engineers working together on specific projects.

I might also mention the GIE (economic interest group) formed around French oil companies (ASVAHL) to exploit heavy oil, or the project to create with Saint-Gobain a materials institute in Lorraine. The frame of mind has changed a great deal. Remember how in 1978 several thousand researchers had taken to the streets to protest the first agreement made with an enterprise, Rhone-Poulenc in that case.

Such an attitude is unthinkable today, and no one has lost his soul.

[Question] Will you install a specific program to expand this collaboration?

[Answer] This is not determined by decree, and especially not by a decision from the general directorate. Instead, we must multiply direct contacts between a given laboratory and manufacturers. "Field" approaches and very different approaches are indispensible. It is better to begin with a very small contract and conclude it successfully. I also encourage the formation of study groups where manufacturers could state their problems and needs.

This is the starting point for defining joint projects and for moving beyond the sterile question of "leader" and "led."

[Question] Don't you think that it is sometimes necessary to be more regulatory?

[Answer] We will be more formal in some sectors. In 1987, CNRS will launch research programs in biotechnology and will intensify its efforts in the materials field. But it must also enter into sectors considered for better or for worse as "low technology," such as food agriculture or civil engineering. In the first case we will muster all we can and form work teams consisting of manufacturers and scientists. In civil engineering, discussions are underway with the Central Laboratory for Bridges and Roads. I also believe that technical centers would be good focal points for other operations. We will have to get in contact with them, and with CETIM in particular.

[Question] As former scientific director of Lafarge-Coppee, you are well acquainted with both the research and the industrial world. Is your example not too unusual?

[Answer] Good collaboration takes place first of all between men; they must learn to know and respect each other. And they must not hesitate to move. For researchers, the "making available" procedure is excellent although limited. It has to be continued. When I was director of research at Lafarge-Coppee, I welcomed in two or three researchers every year. It always proved to be a positive experience. Twice in fact, the operation became a recruitement. At CNRS I expect to implement in 1987 specific training to facilitate transfers. To this end, a 10 percent increase in the training budget has already been approved, and I expect it to become 25 percent in 1988. If about 50 researchers are interested at first, I will be overjoyed. The stakes are of prime importance for the French industry, which lacks key personnel with true scientific training. Such men are indispensible for enterprises to adopt without trauma the technological changes with which they are faced today.

[Question] By the same token, don't you also need men from industry?

[Answer] CNRS must be able to recruit high level engineers in important sectors that have been somewhat overlooked. I am thinking of computers, CAD, heavy equipment, and so on. The obstacles are administrative. In order to recruit in very advanced sectors, we must get past the budgetary purge. The rebuilding of a body of contract workers beyond the strict regulatory framework would be a good thing. Actually, this body does exist for our nuclear physics engineers; all we have to do is revive it.

[Question] Aren't all these objectives contrary to the elimination of the valorization directorate?

[Answer] Please understand me. I don't like the term valorization; it is too restrictive. We must develop collaboration and relations with industry. This will be the role of a new directorate, which will also be responsible for all of CNRS's outside relations. It will be installed very soon and I would like to entrust it to an industrialist.

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RACE PROGRAM OBJECTIVES ADOPTED BY EEC

Introduction of ISDN

Brussels EEC PRESS RELEASE in English 22 Dec 86 IP(86) 638 pp 1-3

[Article: "'The Introduction of ISDN in the Community Is a Major Step Towards the Era of Modern Telecommunications' Says Vice-President Karl-Heinz Narjes"]

[Text] On Monday 22nd December, the Council finally adopted a detailed Recommendation on the co-ordinated introduction of the Integrated Services Digital Network (ISDN) in the Community, after having given preliminary political backing to the proposal on 18th November. On request by the Commission, the Council adopted a number of amendments proposed by the European Parliament.

The introduction of ISDN can be considered as the second generation of telecommunications following on from simple telephony and telex. It means the development and more efficient use of the telephone network by digital computer-related techniques, allowing efficient data communications and telematics service.

"In order to achieve the step from the first to the second generation of services the Telecommunications Administrations will invest between them some 6-7 bn ECUs spread over the period to 1993, in addition to the investment required to digitise the network."

"The ISDN is a pre-condition for a smooth transition towards the integrated broadband communications from 1995 onwards which is the objective of the RACE [R&D in Advanced Telecommunication Technologies for Europe] program. Integrated broadband communications will offer via one physical connection the full range of services - ISDN services and moving picture."

ISDN will offer from 1988 onwards more efficient telephony, including more advanced telephone services such as notification of incoming calls; more services such as high speed facsimile with an A4 sheet being transmitted in one second and teletex at 100 times the present telex speed and with better quality; and new services becoming available such as interconnection of office systems and computer terminals.

"The unanimous agreement in European Parliament proves the wide awareness of the importance of the introduction of this new nervous system for Europe's future information economy. The European Parliament has laid special emphasis on a strict follow-up and rapid implementation of this Recommendation."

"According to the amendments accepted, the Commission will submit an annual report on the implementation to the European Parliament. Further, special attention will be paid to protecting the privacy of the citizen."

"The Commission will undertake, in support of the Recommendation, a four-year program to promote the co-ordination of efforts and rapid application. It plans to allocate, within its annual budget, an amount of 9 million ECUs to this effect for the period 1987-1990."

[Box p 3]

Technical Sheet--Services To Be Provided in All Member States Starting from 1988.

Basic user access: (S or T reference point)	144 Kbit/s (2 x 64Kbit/s "B" channels and 1 x 16 Kbit/s "D" channel)
Primary access: (only at T reference point)	2 Mb/s (30 x 64 Kbit/s "B" channels and 1 x 64 Kbit/s "D" channel)

Circuit switched bearer services at 64 Kbit/s

Teleservices at 64 Kbit/s:

- telephony (3.1 Khz)
- Group IV facsimile
- teletex
- mixed mode teletex/facsimile

Additional telephone services:

- Call waiting:	Indicates to an engaged subscriber that a new calling subscriber is trying to reach him.
- Closed user group:	The possibility to have a number of users on a network, who form a special group for taxation, numbering, facilities, etc. and will thus have similar possibilities as a PABX.
- Direct dialling in:	The possibility of integrating the numbering plan of a PABX in the national plan, allowing direct access from the public network to a terminal connected to this PABX.

Additional detailed specifications, including those for packet switched bearer services, will be prepared in the period from now up to 1990, in the framework of CEPT (European Conference of Postal and Telecommunications Administrations).

OSI Standards

Brussels EEC PRESS RELEASE in English 22 Dec 86 IP(86) 639 p 1

[Article: "'The Council Decision on Standardization in Information Technology and Telecommunications Marks an Important Step Towards the Establishment of a Vast Community Market for New Technology' Says Commission Vice-President, Mr. Karl-Heinz Narjes"]

[Text] At its meeting of 22 December 1986 the Council of Industry Ministers adopted a decision on standardization in the field of information technology and telecommunications. That decision marks an important stage in the creation of a large-scale Community market for this new technology. It forms part of the general Community policy on standards and supplements Directive 83/189 by introducing a procedure for prior notification at Community level, which is a necessary addition to take account of the specific needs of this field. To this end it sets out a detailed program for standardization in this sector and stipulates that public procurement bodies must refer to European standards in their contracts.

The numerous different types of equipment that need to be interconnected, particularly via public telecommunications networks, call for more and more detailed and complex information exchange standards to ensure the communication of the data required for the proper functioning of a society which is becoming increasingly dependent on efficient services.

Standards are being prepared, on the basis of a reference model known as OSI (Open Systems Interconnection) developed by the International Standards Organization (ISO), to enable computers and terminals of different makes to communicate in open mode in a manner similar to the telephone and telex. The same basis is being used by the CCITT (International Telephone and Telegraph Consultative Committee) in the telecommunications field to define the architecture of new digital networks and to specify the datacommunications services of the future.

The technical work that has to be done to harmonize such standards in Europe will be entrusted to the European standards bodies CEN [European Standards Committee] and CENELEC [European Committee for Electrotechnical Standardization] and to the CEPT for telecommunications. The task of these bodies will be made easier by the fact that numerous industrialists and, more recently, major users have undertaken to collaborate in this venture and to promote even broader cooperation internationally.

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BACKGROUND ON INTERNAL EC DISAGREEMENTS ON R&D FUNDING

Rotterdam NRC HANDELSBLAD in Dutch 6 Dec 86 p 15

[Article by Eefke Smit: "There Were Plenty of Fine Words but Now That Money Has To Be Found, the Mood Has Suddenly Changed: European Technology Programs at Financial Impasse"; first two paragraphs are source introduction. Note: Unable to agree on increased high-tech R&D funding, the EC ministers on 19 Dec cancelled a meeting at which they were to have decided upon the 1987-91 R&D budget. No new meeting date was set.]

[Text] In the last few years, European ministers' conferences on technology have been constantly surrounded with a lot of fuss: The new spirit of Europe had been discovered, there was work in the shop. Every meeting was characterized by unity on this subject. Technology was the thing that would again bring Europe up to speed again with the United States and Japan. One initiative after the other was launched for joint subsidy programs.

Next week and the week after, two more such ministers' conferences will be held. The ministers will all be there again, but the mood of the last 2 years will be missing. The reason for this will be all but obvious: Fine words cost money. The euphoria concerning the European technology programs has suddenly become the subject of scepticism.

Brussels, 6 Dec--What European prime minister has not, in the past few years, thumped his chest as the champion of a "Europe of technology"? Initiative after initiative was launched. First came the EC programs like Esprit (information technology), Brite (industrial manufacturing techniques) and Race (telecommunications), and afterwards Eureka with, if possible, still more fuss, a prestigious proposal by French President Mitterrand.

The mood has changed quite suddenly in the past few months. Not so much in industry, which continues to forcefully promote the importance of the initiatives. In political circles, however, the enthusiasm has had to give way to a critical attitude. The EC ministers council of next Tuesday, where the Community's technology budget for the next 5 years will come under discussion, stands before some large problems: The large countries are themselves scarcely ready to maintain the current technology budget, let alone increase it. There is a fearful suspicion that the Eureka conference in Stockholm the week after may well be the last one for the time being.

What is going on? A high EC official in Brussels, charged with management of the EC programs, expresses it quite nicely: "Following the fashion and shouting about how important technology is, is not so difficult. Now, money has to be laid on the table and things are suddenly different."

The financing of the European technology programs is at an impasse: Upon closer inspection, the larger countries would rather do it on their own. Even a small country like the Netherlands, which is receiving more from the programs that it needs to pay out, is promoting European thriftiness.

Killed

The problems are clearest in the EC programs. No one questions their success, but specifically the United Kingdom, West Germany, and France now no longer see any motive for continuing them at such a rate. The European Commission's first proposal to raise the current budget for the coming five years to a good 10.3 billion ecu (approximately 24 billion guilders) thus was quite quickly killed. Now, there is a proposal of 7.7 billion ecu (approximately 18 billion guilders) or, to be precise, 3 percent of the entire EC budget.

France, Germany, and England also view this increase as too much. Their last offer hovers around 5 billion ecu (approximately 12 billion guilders). According to Karl-Heinz Narjes, the European Commissioner responsible, this is not at all sufficient to maintain the current level of the programs. For this, in his opinion, at least 6.2 to 6.5 billion ecu will be needed. Even the Netherlands is below this, with an offer of 6 billion ecu.

Eureka seems, at first glance, to be encountering fewer head winds. In one year's time, the list of Eureka projects has grown to a total of 72. At the upcoming ministers' conference of 17 December in Stockholm, this list will grow to easily above a hundred. The costs will come to roughly 4 billion altogether (approximately 9 and 1/2 billion guilders). The official approval that the ministers will obtain does not, however, say anything about the financing. With the exception of France and Germany, where a budget of a few hundred million guilders has been reserved, the subsidization in the other participating countries has not been complete for some time. After official approval, each national government must itself look at whether and how it will subsidize the Eureka projects with its own funds.

The Hague's Ministry for Economic Affairs has reservations about this. In the Netherlands, a small budget of 30 million guilders has been earmarked for "preparatory studies." It is emphatically stated here that this is not the same as subsidizing the entire project. That will have to be examined anew, piece by piece, after completion of these feasibility studies.

Since no subsidies have yet been granted for most of the approved Eureka projects, many insiders fear that Eureka will slowly suffocate. Here and there, the question is posed as to whether the ministers of the 19 countries will be ready a year from now to get together yet one more time and distribute Eureka awards that still have no content in most of the countries. The brand new Eureka secretariat in Brussels refuses to comment at all on questions of

this sort. "Those are national political problems," is the answer, "we do not wish to make any political pronouncements concerning the governments."

Out of Fashion

The resistance to having the European technology programs actually cost money has differing backgrounds. The most significant is the changing climate: Extensive subsidies to industry have gone out of fashion. With the relief funds for industries in difficulty having come under fire in nearly all countries (compare the RSV discussion), the high-tech subsidies are now also being viewed critically. The large EC countries that now object so much to the proposed EC budget are employing these free-market arguments with a certain pleasure. But these countries are not consistently holding to that reasoning.

For France, West Germany, and England are at the same time making no secret of their preference for spending the EC technology budget themselves. "Why Brussels, when we can do it better ourselves?" said Geoffery Patty, the British Minister of Technology, in an interview a few months ago. The same thing is being thought in the other large EC countries. The German budget of the Federal Ministry for Research and Technology, for example, is twice as large as the proposed EC budget. "For us, a Brussels budget of 3 billion ecu would be sufficient, as a supplement in the EC framework, for the things that we cannot do on our own," according to Emil Gruber, the German government's negotiator at the EC.

"It is purely the reluctance to let go of their national programs," says EC commissioner Narjes. "They are speaking their own words of a year or two ago. Europe has been out of it for a long time, compared with Japan and the United States. Success will only come with a joint effort. And they see that themselves, but to the extent that they need European cooperation in their national programs, they prefer bilateral private deals. Then they do not have the burden of a European Commission that wants to stimulate technological cooperation with, for example, Greece and Portugal."

The West German negotiator Gruber formulates this last argument somewhat differently, but it amounts to the same thing: "The FRG does not view an increase in the EC budget as effective. A much too large portion of that money has to be earmarked for the less developed member nations' attempt to catch up. You would do better to let that money be used by the member nations who are in the lead. Then you are doing something genuine about the Japanese and American threat. Not if you strive for a European mediocrity."

At Akzo and Philips, people do not find it surprising that the French, the English, and especially the Germans want to keep their technology subsidies in their own hands. Dr A. Dijkxhoorn, research director at Akzo, knows from his experience with the German Eureka division that the technology policy in West Germany is well organized. "They can do it even by themselves," he says. "They have an extensive budget and their ministry is superbly organized. Better than Brussels. With them, for example, the Eureka financing is much more flexible than in the Netherlands. We have been waiting now since 1985 for a Eureka subsidy of a couple hundred thousand guilders from the Hague.

That sum is almost no longer worth the effort of the tug-of-war. We are currently viewing this Eureka project as a trial balloon. If nothing comes of the subsidy, then we will no longer bother with our Dutch Eureka projects." He continues: "I have grave doubts about the financing from The Hague; the attitude there has changed drastically since the extensive subsidies for Philips' mega-project. We do have financial security with the EC programs. And so our preference lies with EC programs." Moreover, Akzo need not suffer real harm from The Hague's uncertainty: "Fortunately, we have adequate investments in other European countries," says Dijkxhoorn. "If, in the future, the EC programs lose to Eureka, then we will look elsewhere for support for those projects."

It is the same story at Philips. Dr N. Hazewindus, director of development coordination, explains that Philips is receiving approximately 130 million guilders from Brussels, but still has not received one single approval from The Hague for its Eureka projects. "Brussels offers a lot more security."

Tragedy

The countries against a higher EC budget find themselves more or less in the comfortable position of themselves having an alternative. In the first place, there are their own national programs. In the second place, they also get a lot with Eureka, the European alternative to the EC programs: Their budget is large enough to finance the Eureka projects and, in addition, they then have the opportunity to pick their partners and to pick important projects for themselves.

The situation is different for the Netherlands. Akzo complains openly of the shortcomings in the Dutch technology policy ("not a good climate"); Philips has made it known several times that the Netherlands are lagging behind the countries surrounding us, and that the technology budget should be increased by several hundred million guilders. Or, to use Hazewindus' words: "The tragedy of Philips is that it is a really big company in a really small country with a small budget."

A trend towards more national policy, at the cost of European policy, thus is not advantageous for Dutch industry. Things are organized better in Brussels. The Netherlands, as a small country, can scarcely join in, compared with the "big ones"; in addition, the national subsidies tend to drive each other up. Every country wants to be quick to give just a little more than its neighbor, even if it be only to prevent companies from moving to that neighboring country. For the Netherlands, that is a race that is lost from the start.

Philips also "very strongly" deplores that even the Dutch government does not support the current proposed EC budget. Hazewindus: "It is shortsighted. The Netherlands gets more back from this than it contributes." He can get outright angry about the fuss over a billion more or a billion less. "Scandalous! It is a matter of a sum that is less than a week of EC support for agriculture."

Welfare State

Advantageous or not for the Netherlands, the central issue remains whether all these subsidies are really necessary. At Shell, the one Dutch multinational that is holding aloof from all these programs, this question is initially answered with "no." "You are creating a welfare state for industry," says Dr H. L. Beckers, research coordinator at Shell. "It cannot be good to let officials choose what is important. I always picture it as follows: Imagine that you as a company have a very good project, a mediocre project, and a very obscure project. You can pay for two of them by yourself, and for one you need a subsidy. Which are you going to keep in your own hands, and which are you going to let the government pay for?" He continues: "I am happy that the tendency towards all these subsidies is shifting."

Nonetheless, Beckers also pleaded in Brussels that the technology budget not be drastically reduced. "The situation is different now for companies like Akzo and Philips," he says. "The water is up to their necks, they have to deal with Japan, the monster that uses rules that are not valid here. And with the United States, where the Pentagon subsidizes technology projects 100 percent. If, in this situation, you only argue shortsightedly for the free-market mechanism, then you are sunk. Philips and Akzo simply need the money very badly."

His preference lies with the EC programs, less with Eureka which, in his opinion, again displays just too many national tendencies. According to Beckers, one important goal sanctifies the EC's subsidy methods, the unification of the European market. "It is a basic goal, a hidden objective, I admit, but it is indeed coming a bit closer with these EC programs. They are continuously calling attention to this. These Eureka projects do so much less, they offer the opportunity for bilateral private deals in which the smaller and less developed countries cannot participate. This big European home market, that is what it ultimately has to be about. The EC programs are helping with this. I have once again strongly impressed this on Narjes."

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CSO: 3698/166

FINNISH PAPER PRAISES EUREKA GOALS, GROWTH

Helsinki HELSINGIN SANOMAT in Finnish 28 Dec 86 p 2

[Editorial: "Eureka Grows at Champion Speed"]

[Text] The minister level meeting of the Eureka organization held in Stockholm before Christmas proved that the 19 Western European countries have indeed launched their high-tech development organization. Including the new projects Eureka already has 109 international projects with an aggregate cost estimate of almost 17 billion markkas. Eureka is among the fastest growing forms of European cooperation. Having been in operation for only a year and a half it already is breaking records.

Finnish enterprises are participating in a dozen research projects. That is a relatively satisfactory compromise level since entry by Finns was delayed in the very beginning and since the size of Finnish companies in general and research activity in particular is smallish compared to European giants.

At this moment Eureka is generally recognized as an organization for the development and research of high-technology for peaceful purposes. At least no one is any longer loudly expressing misgivings about its being a military project even though it is obvious that many an aspect of high technology has adaptations for civilians as well as soldiers.

The most important Western European countries conduct their own independent defense policy within the framework of the Western European Union (WEU). This coordinates the procurement of weapons and munitions by six western nations from research to manufacture. In a sense its role is supplementary to NATO as Europ's separate insurance in the event of a surprise withdrawal of the U.S. forces.

It is, of course, clear that the WEU circles study with great interest the military applications of high technology but it is not participating in Eureka with its own projects. The defense department of the WEU would hardly want to reveal its secrets or to release its inventions into the free markets like Eureka is doing.

Eureka's purpose is to guarantee Europe's competitiveness against the mighty technologies of the United States and Japan. Success in this endeavor is, of course, uncertain for even though it is recognized as a high stakes contest artificial limits are encountered too often.

The United States will progress with giant strides from modern technology toward some entirely new stage because of, above all, research on its SDI or Star Wars project. The gap is probably widest in the computer field where America is developing supercomputers that use light instead of electricity as a power source. Among technological innovations with entirely civilian applications the field of new materials develop is an area where the needs of Star Wars will advance research.

Japan has invested in the same fields as the United States. They both enjoy large domestic markets while Western Europe, despite efforts towards unity, is still a clumsy customs bureaucracy. The EC is aiming toward unrestrained domestic markets by 1992 but it does not necessarily follow that the EC is willing to extend the same non-restraint privileges to the entire Eureka group.

Eureka's future problems will likely include questions on how to decrease barriers to trade, customs duties and other formalities and also how to promote uniform standards. The neutral countries in Eureka cannot go along with EC integration for that would lead to a dependence on the community. Eureka's internal formalities must be diminished in some other way than integrating the EC.

One of the advantages of Eureka from the very beginning has been the concept of its dexterity and flexibility. It attends to serving the needs of whatever research projects are current. The commercial applications of developments become the worry of the participating nations and companies after free access to the high technology is provided for the members. As long as this line is pursued the organization will not become a political liability.

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EUREKA: SIX SWEDISH INITIATIVES, GREATER INTEREST, SATISFACTION

Six Swedish Initiatives

Stockholm NY TEKNIK in Swedish 18 Dec 86 p 17

[Article: "Six Totally Swedish Initiatives"]

[Text] Sweden is participating in 10 to the approximately 50 projects that are being considered at the ministers' meeting. Six of them were started at the initiative of Sweden.

1. If the crystalline structure of a zeolite is twisted and turned, it can be made to absorb different substances. Zeol AB now has the technology to use manipulated zeolites to remove solvents from air. When the filter is full, the zeolite is subjected to a gas that makes the solvent flow out of the filter. Both the zeolite and the solvent can be reused.

A West German firm will now contribute the process technology that is required for large-scale production.

2. Electron accelerators should be able to be used in industrial applications, according to the development firm Kvantek. Together with a Finnish firm, it will test electron accelerators in mass-production applications and for removing sulfur and nitrogen oxides from industrial emissions.

3. HTS AB, together with a West German and a Netherlands computer firm, will attempt to develop a powerful computer support system for translators. It will be capable of handling all the languages of the world and serve as a kind of channel connecting various national language data bases.

4. By coating the surface of windows, they can be made to let in and out precisely the right amount of light. Coat AB will develop this method, together with a West German firm.

5. The Institute of Polymer Technology of KTH (Royal Institute of Technology) in cooperation with Norway will try to develop better methods for predicting the material properties of thermoplastic products.

6. Ink jet printers now operate extremely well for marking expiration dates on products, for example. The Swedish Match company Tarkett wants to improve

this technology so that ink jet printers can be used to imprint detailed patterns in many colors on products with complicated shapes. Cooperation has already begun with a company in the Netherlands.

Sweden's Goals

Stockholm NY TEKNIK in Swedish 18 Dec 86 p 16

[Article by Maria Holm]

[Text] On Wednesday 17 December Sweden's hosting of Eureka came to an end. Eureka is Europe's answer to the American space defense program SDI. Both France, which initiated the project, and Sweden seem to be satisfied. After 1.5 years, the project has now really gotten off the ground. After 1 year, in June of this year, 72 projects involving European industrial cooperation had been approved. Last Wednesday about 50 more projects were discussed.

NY TEKNIK reports here on the role of Sweden and France in Eureka and presents the new, totally Swedish proposals for new cooperative projects.

"Personally, I am satisfied with Sweden's efforts during this period. What other countries think will probably come out during the conference," said Sweden's "Eureka general" Ulf Dinkenspiel.

Sweden, as the first non-EC country, began its 6-month chairmanship at the ministers' meeting in London last June.

At the ministers' meeting in Stockholm on 17 December the chairmanship will be passed on, in all probability to Spain.

"In reality, we have only had 4 months of effective working time," Ulf Dinkenspiel said.

"After all, all of Europe is closed for the summer."

The chairmanship entails a number of formal tasks. The country must serve as the host for preparing so-called high-level meetings, it must collect and send out information on new projects, and finally it must organize the ministers' conference that makes all the important decisions.

Four Goals

In addition to this, Sweden announced some more general goals for its work during this period:

To get Eureka's planned secretariat in place in Brussels, as well as the data base that, in the future, will keep track of all ongoing projects.

"We have recruited the seven people who will work at the secretariat. So far, however, they have been unable to move into their offices, although this

will occur early next year. The data base has been established and it is now in Sweden. It, too, will be moved early next year," Ulf Dinkelspiel said.

To produce as many high-quality projects as possible.

"Of the approximately 50 projects that will be discussed in Stockholm, I believe that about 40 are of extremely high quality," Ulf Dinkelspiel said.

Obstacles To Remove

To step up market support work which is supposed to accompany the various Eureka projects.

"There are a number of obstacles to trade that must be removed, such as various requirements with regard to standards. Basically, the obstacles vary from project to project and we have attempted to find a suitable form for such discussions. It remains to be seen, however, if Eureka can be an effective model for such adjustments between countries," Ulf Dinkelspiel said.

Small Business Participation Encouraged

Stockholm NY TEKNIK in Swedish 18 Dec 86 p 17

[Article by Maria Holm]

[Text] Small businesses in Sweden have now become interested in Eureka. Sweden is participating in 10 of the approximately 50 projects that will be discussed at the ministers' meeting in Stockholm. Most of them came about at the initiative of small high-tech development firms. Unlike the small firms, however, large Swedish companies doubt the usefulness of Eureka.

"We are a small company in a small country. It would have been extremely difficult for us to make international contacts on our own," said Kaj Vareman of Zeol AB, which will now participate in the Eureka program, along with the giant West German firm Degussa AG.

Zeol AB has developed a method for manipulating zeolites so that they will absorb solvents and be used in filters for purifying industrial air.

"But we have neither the know-how nor the possibility of developing methods for the mass production of such filters. The West German firm Degussa AG, on the other hand, has this ability. We are very hopeful with regard to this cooperation," Kaj Vareman said.

Government Support

The large company ASEA, on the other hand, is not as enthusiastic.

"As long as Eureka is just shuffling papers, it will not contribute much toward European cooperation," Kurt Brisby said.

"The project must be linked to the possibility of governmental support. We started a Eureka project 6 months ago, together with a firm in Switzerland. It involves the development of power electronics and our cooperation is so natural that it surely would have come about without Eureka."

Stumbling Block

Government funding for Eureka projects has been a stumbling block from the very beginning.

Actually, earmarked money for Eureka projects exists only in France. In Denmark, England, the Netherlands, and Spain, the government guarantees some of the companies' costs, but this is for preliminary studies for possible future projects.

No Eureka Fund

Otherwise, the project participants must seek support through the existing channels of their respective country--the Industrial Fund and STU (National Swedish Board for Technical Development) in the case of Sweden.

"A separate Eureka fund with its own bureaucracy is hardly a possibility in Sweden," said Ewa Gronlund of the Industry Ministry.

"On the other hand, we are discussion the possibility of placing a high priority on Eureka projects when funds are distributed by the Industrial Fund and STU."

In this way, Sweden would join Norway, Finland, Austria, and England which now give (or are in the process of introducing) special treatment for projects with Eureka status.

French Role Reviewed

Stockholm NY TEKNIK in Swedish 18 Dec 86 p 17

[Article by Miki Agerberg]

[Text] Paris--France is now playing a less dominant role in Eureka than it did in the beginning. But this is not because French involvement has been reduced, but because several other countries have stepped up their activities.

France, as the instigator, carried a heavy load in the beginning. Now the Eureka machine is rolling along more and more under its own power.

Of the 72 Eureka projects that were in existence before the ministers' meeting in Stockholm, France was involved in no less than 49 projects. This is a figure that no other country even approaches, but France will be involved in only about one third of the new projects approved in Stockholm.

"This is only natural," said Serge Gregory at the French Eureka Secretariat.

"After all, it was France that took the initiative. Now the other countries have become more active."

He mentioned Sweden as one of the countries that have now become more active in Eureka. The Swedish chairmanship during the past 6 months has been significant.

Greater Swedish Interest

This picture was confirmed by Olof Nordling, Sweden's technical attache in Paris.

"The interest of Swedish companies in Eureka has increased during the past 6 months," he said. "Now there is no doubt concerning Sweden's involvement.

"At the same time, we see that the channels of contact have become more direct. Eureka's own network is beginning to function better and more independently."

France is still carrying the heaviest load. French Eureka coordinator Yves Sillard has calculated that France (the government and companies together) pays about 40 percent of the costs in the 72 Eureka projects that are now underway.

He believes that this figure should be reduced.

"When Eureka is in full swing, about 25 percent of the costs would be reasonable for France."

This does not mean a reduction in the absolute amount of French investments, however. On the contrary, Eureka has done remarkably well through the austerity policies of the nonsocialist government and next year, as well, French companies investing in the Eureka project can count on generous support.

One Billion Francs

When Eureka first began, the socialist government promised 1 billion francs (approximately the same number of kronor) in government support to the Eureka project during the first year, 1986.

The nonsocialist government that took power after the elections last spring cut this year's Eureka budget to about 700 million Francs.

This has meant little, however, since only about 500 million francs were needed during the year. It takes time for the projects to begin. Appropriations for Eureka in the 1987 French national budget total 700 million francs.

The government is showing greater restraint with regard to the new projects and would prefer to see the companies themselves assume a greater share of the costs.

Nevertheless, the budget means that France will continue its deep involvement in Eureka and will back up this involvement with government subsidies that are unparalleled in any other country.

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CSO: 3698/204

ITALIAN RESEARCH MINISTRY ALLOCATES FUNDS FOR COMPANY R&D

Rome GAZZETTA UFFICIALE DELLA REPUBBLICA ITALIANA in Italian 14 Jan 87 pp 30-38

[Announcement of the Italian Ministry for Scientific and Technological Research on the "Admission of Research Projects to the Special Fund for Applied Research," issued in Rome on 14 January 1987]

[Excerpts] The following research projects will receive financing from the Special Fund for Applied Research under the terms of the aforementioned laws. The size of these awards and the related terms and conditions are specified for each project:

Aeritalia--Societa Aerospaziale Italiana SpA, Naples, large company classification.
Place of execution: Southern Italy.
Program: Advanced aircraft (VMA).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 17,171 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs of 42,928 million lire; b) 8,585 million lire subsidy, not to exceed 40 percent of 1/2 of the allowed costs of 42,928 million lire, (leaving 1/2 [21,464 million lire] of the above subsidy still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 April 1986
The above award is subject to approval from the EEC Commission.

Aeritalia--Societa Aerospaziale Italiana SpA, Naples, large company classification.
Place of execution: Southern Italy.
Program: Primary aeronautical structures in composite material (No 48205).

Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 18,802 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs of 47,005 million lire; b) 9,401 million lire subsidy, not to exceed 40 percent of 1/2 of the allowed costs of 47,005 million lire, (leaving 1/2 [23,502.5 million lire] of the above subsidy still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 May 1986.
The above award is subject to approval from the EEC Commission.

Alfa Romeo Avio SpA, Naples--Fiat Aviazione SpA, Turin, large company classification.
Place of execution: Northern and southern Italy.
Program: Design and development of a turbine engine for civil and military applications (No 47878).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 3,050 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs for southern Italy; b) 3,050 million lire subsidy, not to exceed 40 percent of the allowed costs for southern Italy (leaving the allocation for northern Italy of the allowed costs, equal to 4,805 million lire, still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 4 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 February 1986.

Diavia Spa, Teserio (Trento), large company classification.
Place of execution: Northern Italy.
Program: Plastic material supports for auxiliary parts of endothermic motors (No 48389).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister.
Maximum amount: 893 million lire in the form of easy credit, not to

exceed 70 percent of the allowed costs.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 3 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 September 1985.

Engineering--Ingegneria Informatica SpA, Padua, large company classification.
Place of execution: Northern and southern Italy.
Program: Automation for software engineering (No 48154).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy.
Maximum amount: a) 5,622 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs for southern Italy; b) 5,622 million lire subsidy, not to exceed 40 percent of the allowed costs for southern Italy, (leaving the allocation for northern Italy of the allowed costs, equal to 7,116 million lire, still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 February 1986.
Special conditions: Share increase through a cash payment of 1,000 million lire (from 1,250 million lire to 2,250 million lire), three-tenths of which must be paid prior to stipulation of the financing contract, with the remainder to be paid in 1987;
Undertaking not to distribute profits for the operating years 1986, 1987, and 1988;
Review of the plan for industrial exploitation of the results at the end of 1988, to be made on the basis of the results obtained at that time as well as market developments and the state of the art.

Isotta Fraschini SpA, Milan, large company classification.
Place of execution: Northern and southern Italy.
Program: Diesel engine with low magnetic signature (No 48154).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy.
Maximum amount: a) 3,592 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs for southern Italy; b) 3,592

million lire subsidy, not to exceed 40 percent of the allowed costs for southern Italy, (leaving the allocation for northern Italy of the allowed costs, equal to 4,412 million lire, still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 2 May 1986.
Special conditions: Guarantee to be provided by the majority shareholder.
The award is subject to a check by MRST [Ministry for the Coordination of Scientific and Technological Research Initiatives] to ensure that there is no duplication of financing from the Ministry of Defense.

Italtel Telematica SpA, Santa Maria Capua Vetere (Caserta), large company classification
Place of execution: Northern and southern Italy.
Program: Terminals and services for the ISDN [Integrated Services Digital Network] network - Phase 1 (no 47984).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy.
Maximum amount: a) 3,085 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs for southern Italy; b) 3,085 million lire subsidy, not to exceed 40 percent of the allowed costs for southern Italy, (leaving the allocation for northern Italy of the allowed costs, equal to 7,244.6 million lire, still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 6 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 July 1985.

Magnaghi Napoli SpA, Naples, large company classification.
Place of execution: Southern Italy.
Program: Landing gear in composite material (No 48389).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 1,044 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs; b) 1,044 million lire subsidy, not to exceed 40 percent of the allowed costs.

Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 January 1986.

Nuova Sanac SpA, Genoa, large company classification.
Place of execution: Northern and southern Italy.
Program: Ceramic materials with defined thermal and mechanical characteristics (No 47859).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister.
Maximum amount: 2,559 million lire in the form of easy credit, of which: 1,943 million lire, not to exceed 70 percent of the allowed costs, to northern Italy; and 616 million lire, not to exceed 80 percent of the allowed costs, to southern Italy.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 4 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 March 1986.
Special conditions: Guarantee to be provided by the iron and steel financing company, Finsider SpA, Rome.

OCN SpA, Marcianise (Caserta),--OCN Sistemi SpA, Ivrea (Turin)--Esercizio Pietro Pontiggia PPL SpA, Ivrea (Turin), large company classification.
Place of execution: Northern and southern Italy.
Program: Development of operating units, management methods, and system architectures for factory automation (No 44867).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 9.341 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs for southern Italy; b) 9.341 million lire subsidy, not to exceed 40 percent of the allowed costs for southern Italy, (leaving the allocation for northern Italy of the allowed costs, equal to 16,957 million lire, still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 5 years and 10 months.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be

paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 March 1984.
Special conditions: Guarantee to be provided by Ing. C. Olivetti & Co. SpA, Ivrea (Turin).
The above award is subject to approval from the EEC Commission.

Olteco--Olivetti Telecomunicazioni SpA, Ivrea (Turin), large company classification.
Place of execution: Northern Italy.
Program: Equipment for the coded transmission of documents (telex link-up) (No 48851).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister.
Maximum amount: 2,811 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs.
Duration: Seven-year amortization period in addition to the time needed for the research program. The latter must not exceed 4 and 1/2 years.
Amortization: Fouteeen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 April 1985.

Selenia--Industrie Elettroniche Associate SpA, Naples, large company classification.
Place of execution: Northern and southern Italy.
Program: Avionics computers for multipurpose helicopters (no 48352).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 4,778 million lire in the form of easy credit, of which: 166 million lire, not to exceed 35 percent of the allowed costs, for northern Italy; and 4,612 million lire, not to exceed 40 percent of the allowed costs, for southern Italy; b) 4,778 million lire subsidy, of which: 166 million lire, not to exceed 35 percent of the allowed costs, for northern Italy; and 4,612 million lire, not to exceed 40 percent of the allowed costs, for southern Italy.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 4 and 1/2 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due

date following the effective date of completion of the research program.
Starting date of the program: 1 July 1986.

Selenia--Industrie Elettroniche Associate SpA, Naples, large company classification.
Place of execution: Northern and southern Italy.
Program: Advanced ATC [Air Traffic Control] systems - Phase 2 (no 48352).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 1,223 million lire in the form of easy credit, not to excewed 40 percent of the allowed costs, for southern Italy; b) 1,223 million lire subsidy, not to exceed 40 percent of the allowed costs, for southern Italy, (leaving the allocation for northern Italy of the allowed costs, equal to 14,917 million lire, still to be financed).
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 4 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 17 June 1986.

TVR--Tecnologie Vetroresina SpA, Rome, large company classification.
Place of execution: Southern Italy.
Program: Automatic process for the production of manufactured goods in composite material (No 48212).
Form of financing: Credit available at an annual rate of interest established by a decree of the treasury minister; subsidy. Maximum amount: a) 1,333 million lire in the form of easy credit, not to exceed 40 percent of the allowed costs; b) 1,333 million lire subsidy, not to exceed 40 percent of the allowed costs.
Duration: Eight-year amortization period in addition to the time needed for the research program. The latter must not exceed 4 years.
Amortization: Sixteen, semi-annual, equal-deferred installments, to be paid at the end of each 6-month period and inclusive of capital and interest. The first payment must be made no later than the second due date following the effective date of completion of the research program.
Starting date of the program: 1 June 1986.
Special conditions: Guarantee to be provided by Mr Renzo Ghiotto.

8616
CSO: 3698/M145

FRENCH VENTURE CAPITAL MARKET MATURING

Paris TERTIEL in French Dec 86-Jan 87 pp 60-61

[Article by Marie-Jeanne Pasquette: "Venture Capital From A to Z"; first paragraph is TERTIEL introduction]

[Text] Fr 5.5 billion of venture capital in France. Young but already extremely active, the field is constantly evolving.

Ten years ago, the term venture capital meant little or nothing to the directors of most companies. Today, it has become a veritable profession, practiced by some 100 organizations in France. Financing of unlisted companies by these equity-capital professionals now amounts to Fr 2.5 billion of the total Fr 5.5 billion available within the profession.

Creation capital, development capital, and conversion capital: Venture capital funds are specializing. This was discussed by Pierre-Jean Raugel, of Precepta's advisory board for investment strategy, in a 500-page study entitled "Venture Capital in France." This information provides a detailed look at the activities of 72 such funds, including a list of the investments of most of them.

Although still young, the profession has already undergone substantial change. "Development capital," i.e., capital investment in established companies, occasionally just prior to their listing on the second market, currently represents 22 percent of the funds' investments. "But this source of business is drying up," according to the author of the study. "Companies preparing to enter the second market are becoming less common and much more expensive."

The investment activity known as creation capital is similar to American venture capital. It involves funding for start-up companies whose turnover is often less than Fr 50 million. This activity accounts for about 50 percent of all venture capital operations and 30 percent of the amounts invested. Insertion of capital continues to grow in this area. "Today, a Fr 500,000 investment is unlikely to return substantial profits," observes Pierre-Jean Raugel. The minimum ante has risen significantly. Thus, the average investment by Sofinnova, which specializes in such investments for high tech companies, was originally Fr 700,000; now its investments are running between

Fr 2 million and Fr 3 million. Consequently, we see much more frequently that ambitious business projects are being created by teams from major companies--the "top of the line" creators, in venture capital jargon. Tigre, Transia, Bioetica, and Agde all represent start-up investments of tens of millions of francs. Herve Hamon, president of AFIC (French Association of Venture Capital Investors), is delighted with this trend. "In the United States spin-offs account for 95 percent of all venture capital activity," he emphasizes.

But the profession had even greater hopes for conversion capital activities. Funds such as Team (Credit National), Avenir Entreprises (CEPME), and Cofidic (Paribas) are currently focusing their efforts on conversion capital by investing in companies transferred to their managers or to external ownership. This field is difficult because of the law of July 1984. This law, which encourages employee buyouts of their companies, is too restrictive to permit large investments. Still, the figures speak for themselves: "Within a year or two, we will see the beginning of large transactions. The potential for conversion capital is enormous, involving thousands of cases," according to Jean-Pierre Raugel. Here, everyone agrees. Indeed, we need only count: In 1984, 30 percent of all heads of companies were over 53 years old, representing as many businesses that will be turned over in the coming 10 years.

The financial strength of a company also affects the size of the average investment, which ranges from Fr 700,000 for companies with less than Fr 10 million in turnover to Fr 3.2 million for those with a turnover of more than Fr 250 million.

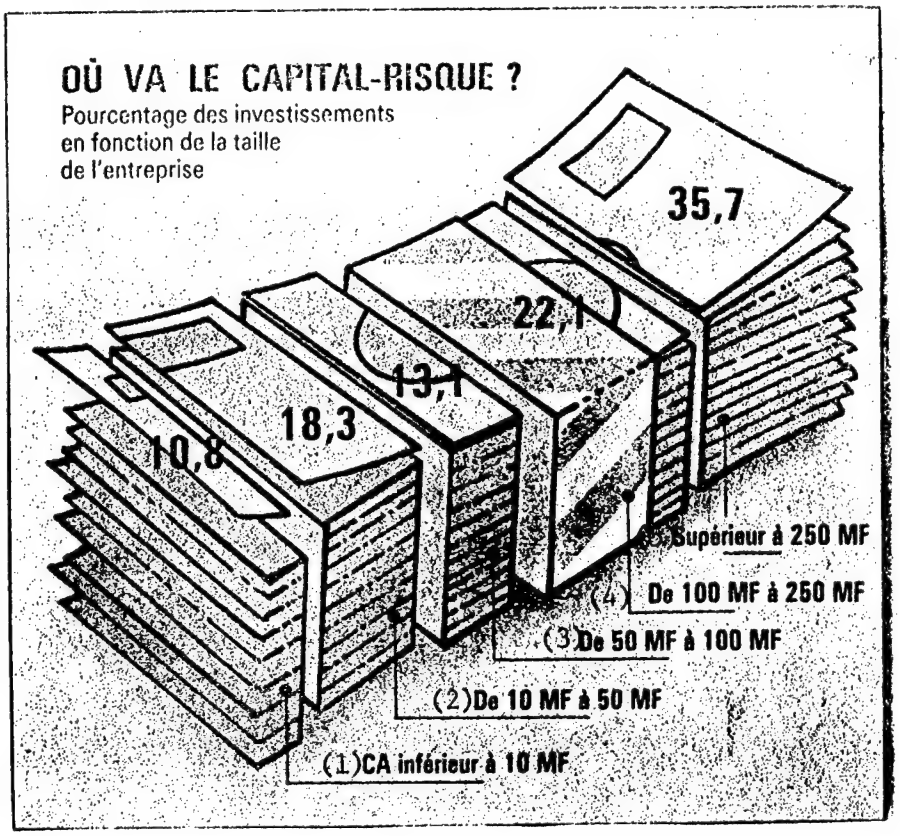


Figure 1. Where Does Venture Capital Go? (Percentage of invesmtents according to the size of the business)

Key:

1. Less than Fr 10 million in turnover
2. Between Fr 10 million and Fr 50 million
3. Between Fr 50 million and Fr 100 million
4. Between Fr 100 million and Fr 250 million
5. Over Fr 250 million

25054/8309
CSO: 3698/A069

KITEC COMPUTER CENTER APPLIES SOVIET, FINNISH DATA TECHNOLOGY

Helsinki HUFVUDSTADSBLADET in Swedish 28 Dec 86 pp 3, 12

[Article by Carl-Gustav Linden]

[Text] Big plans are being made down in the basement of the Kotka Technical High School. That is the location of Kitec, a newly started computer center where Soviet technology is being made compatible with Finnish technology.

The growth potential is demonstrated in part by the fact that Kitec has already been hired by IDC, the American computer market research firm, as its agent in the COMECON (Council for Mutual Economic Aid) countries.

"Our main strategy is to develop our international activities. Nowhere in the West is there so much knowledge of Soviet computer technology as in Finland," executive vice president Heikki Hallantie said.

For the town of Kotka, which started the technology center, this is a way to make sure that the region does not fall behind in economic development. Kitec will also provide local firms and municipalities with Soviet computer technology.

Several years from now, Kotka may have a special meaning to people in the computer industry. At least this is the hope of the town that has founded a technology center where Soviet technology and Finnish technology will be adapted. The fact is that most Western knowledge of Soviet computer technology is concentrated in Finland.

Kitec, as the computer center is called, is presently hidden in the basement of the Kotka Technical High School, but it will soon move to a new location in town.

Kitec is working to development and sell Soviet computer technology to Finnish companies, for their own use and for export projects, and to provide computer technology for municipalities and companies in the Kotka region.

In addition, Kitec keeps up with developments in the Soviet Union and serves as an international consultant for Soviet computer technology.

"In the beginning, we will concentrate on computer systems for harbors. We believe we will have our first project as early as this spring," executive vice president Heikki Hallantie said.

Town Owns 80 Percent

The town owns 80 percent of the shares and hopes that this investment will spur economic development in the entire region and facilitate modernization of an economy that has lost thousands of jobs in recent years.

Part owners include local firms, the Kymmenedalen Chamber of Commerce, local business associations, and others.

Operations began in November with three employees. The three are Heikki Hallantie who is the former director of development at Elorg-Data, Eero Berner, an expert in marine technology, and Liisa Laihanen, translator and secretary.

The company estimates that during its first budget period (17 months) it will have a total volume of 3.5 million markkas. Kitec should be profitable within 2 or 3 years.

"Our range of products will be determined by the market. We are now negotiating on various projects and contracts are either ready or in the works," Heikki Hallantie said.

The first project will be to automate a harbor.

Among other things, the Kitec executive vice president has his eye on continued work at the grain harbor at Reval.

"We have marketing contacts in Reval and Leningrad. We will benefit from these contacts."

Kitec will help increase the border trade between the Kotka region and Leningrad, as well as the Baltic countries.

"At present, this trade has not developed to its full potential."

Estonia does not have the right to conduct border trade independently, but a change in the law is in the works.

Hallantie said that Finnish-Soviet jointly owned companies are not out of the question.

From the very beginning there has been much interest in Kitec. This spring the base of ownership will probably be expanded and major Finnish companies will come on board.

Agent For American Firm

As evidence indicating that Kitec has had a unique position from the start, Heikki Hallantie pointed out that International Data Cooperation (IDC), the large American market research company for computer technology, appointed Kitec as its agent to the COMECON countries.

Kitec's role in this connection is to find solutions to the problem of adapting Soviet computer technology to Western technology.

"Our main strategy is to develop our international activities. Nowhere in the West is there as much knowledge of Soviet computer technology as in Finland. Even though our knowledge is limited, we still have more than anyone else in the world."

Elorg-Data is the largest importer of Soviet computer technology in Finland. The company is owned by the Soviet Elektronorgtekhnika EOT, KOP, Nokia, and Teboil. The Soviet Union is the majority owner. Thus, it operates in the same way as, for example, Konela, Koneisto, Teboil, and the trading firms.

Elorg-Data will gross 90 million markkas this year and will have an estimated annual increase of 30 percent during the next few years. This is being done without a marketing campaign. The firm's clientele--the Education Ministry, government agencies, project exporters--is so narrow that a marketing campaign would not bring in more customers.

Only Sales Channel

This year Elorg-Data will sell Soviet computers for 25 million markkas. Some will remain in Finland and others will go to other Western countries. Since Elorg's jointly owned company in Belgium closed several years ago, Elorg-Data has been the Soviet Union's only steady channel for sales to the West.

"We have made many deals in Central Europe. This may be because the company in Belgium closed," service center chief Martti Leppanen said.

Soviet customers are stressing more and more that they want their projects equipped with Soviet high technology. Finnish project exporters have noted that this can be used as a weapon in the competition.

"Being active in the Soviet Union has a certain PR value for a company," Heikki Hallantie said.

Some major companies purchase computer technology directly from the Soviet Union, that is to say without using Elorg-Data as an intermediary.

Kitec and Elorg-Data will begin working together, even though there is no form of joint ownership.

Embargo Spurred Soviet Union

The strict technology embargo by the United States spurred development of the Soviet computer industry. In 1981 Reagan proclaimed a ban on the sale of high technology with military applications to the Soviet Union and other countries.

That came as a shock to the Soviet Union and as a reminder of how much its high-tech development lagged behind that of other countries.

Today computer experts say that the Soviet technology is perhaps 5 to 10 years behind that of the West, but it is advancing steadily. The head of a Finnish computer firm makes a comparison with Soviet cars. "A Soviet computer is like the Lada. It is not pretty, but it works."

The main problems in the Soviet Union involve construction of the computer network by way of the telephone network as well as software difficulties. The computers that are sold in Finland are developed by Elorg-Data's product development division.

The technology embargo by the United States presents difficulties for Finnish exports to the Soviet Union. Even civilian products contain components that are banned for further export.

There are two ways to get around this problem. First of all, it is possible to include Soviet technology, which is warmly recommended by the Soviets. Secondly, we can develop our own domestic component production. This is what Nokia and its partners have done at the Micronas plant in Esbo.

But the dependence on United States technology cannot be ignored. Consequently, Finnish computer firms and American subsidiaries speak quietly about Finnish participation in the United States trade war against the Soviet Union.

Since our trade with the East is monitored by a licensing system and companies are in mortal fear of being placed on the American blacklist, no one is interested in a major debate--even though people on the left are furious over Finland's willingness to follow the American ban.

Nevertheless, the result of this compliance is that there are no Finns on the American embargo list.

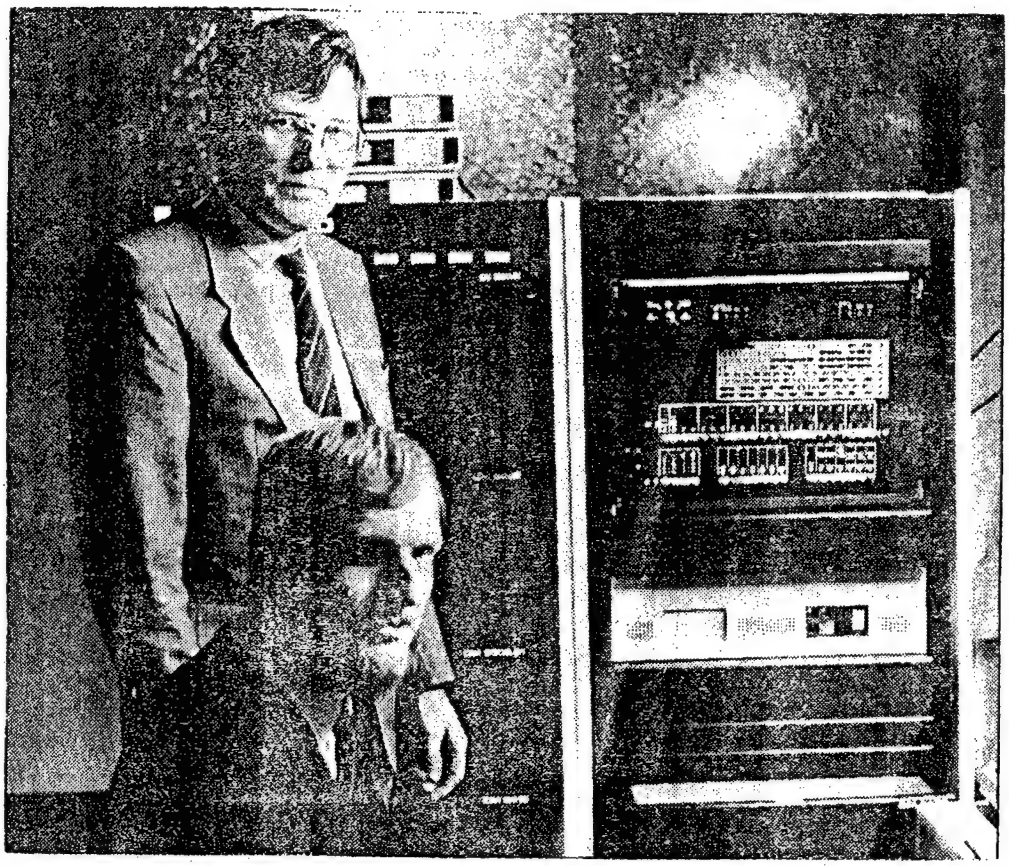
Last fall Ericsson's executive vice president in Finland, Yngve Ollus, predicted in HUFVUDSTADSBLADET that the United States would call off its technology embargo late this decade.

Logically, this prediction could hold true. United States companies have been hit hard, both directly through lost sales and indirectly through lost credibility as a supplier of components. In addition, the European trading partners of the United States have criticized the embargo.

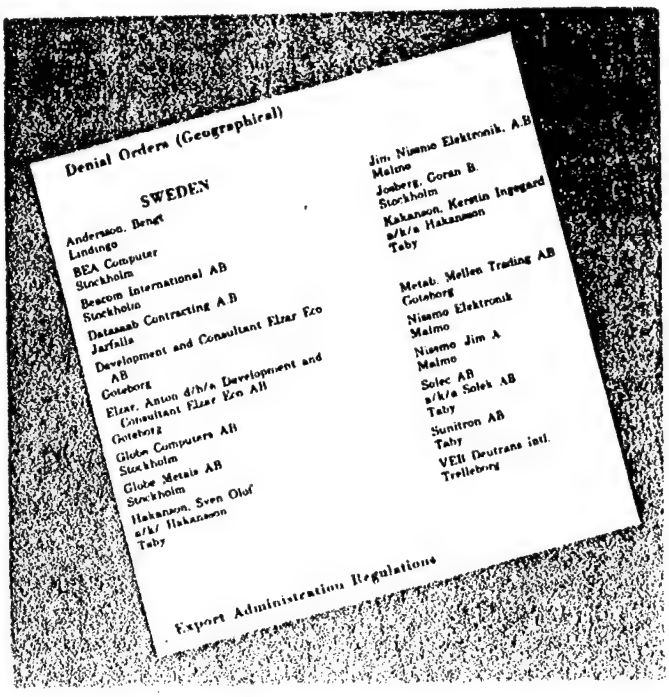
In addition, the Soviet Union is now a different society under Gorbachev than it was in 1982 when Reagan made his ideological decision.

But at the same time, as pointed out by F. Cracklauer, one of the two trade representatives of the United States in Helsinki to monitor the embargo:

"Ever since World War II we have had some form of embargo. It is the degree that varies."



Heikki Hallantie (standing) and Eero Berner at the Soviet SM computer, the base system used at the Technology center.


Denial Orders (Geographical)

SWEDEN

Andersson, Bengt
Lindingo

BEA Computer
Stockholm

Beacom International AB
Stockholm

Datasaab Contracting A.B
Jarfalla

Development and Consultant Elzar Eco AB
Goteborg

Elzar, Anton d/b/a Development and Consultant Elzar Eco AB
Goteborg

Globe Computers AB
Stockholm

Globe Metals AB
Stockholm

Hakanson, Sven Olof
a/k/ Hakansson
Taby

Jim Niemo Elektronik, A.B
Malmo

Josberg, Goran B
Stockholm

Kakanson, Kerstin Ingegard
a/k/a Hakansson
Taby

Metab, Mellen Trading AB
Goteborg

Niemo Elektronik
Malmo

Niemo Jim A
Malmo

Solec AB
a/k/a Solek AB
Taby

Sunitron AB
Taby

VEB Deutrans int.
Trelleborg

Export Administration Regulations

Although Finnish companies have managed to stay off the American blacklist, things have not gone equally as well for Swedish firms.

9336
CSO: 3698/208

BIOTECH CENTERS UNDERSTAFFED, UNDEREQUIPPED

Budapest TARSADALMI SZEMLE in Hungarian No 12, 86 pp 58, 59-63

[Article by Istvan Lang and Pal U. Kralovanszky: "The Future of Biotechnology"]

[Excerpts] The socialist countries have produced significant results in research on traditional biotechnological methods and their economic utilization. They have renowned institutes of microbiology, genetics and biochemistry, enabling these countries to participate in the global race involving the new biotechnology.

During recent years, the CEMA member nations had reconciled the most important biological research tasks whose solution is in their common interest. The scientists of the socialist countries started from the fact that, by advancing biotechnology through the synthesis of new results in microbiology, genetics, biochemistry, physiology and other branches of science, new and broad possibilities can be opened in environmental protection, food production, the production of natural raw materials, the development of manufacturing procedures and, not last, in the diagnosis, treatment and prevention of serious diseases. It is in the interest of every member country to utilize these possibilities as fully and rapidly as possible. At the end of 1985, the rapid development of biotechnology was included in the complex program involving the scientific and technical advancement of CEMA nations up to the year 2000.

In this mainly biotechnological direction, the experts resolved to have joint research and development for the solution of over 160 problems. The joint projects to be done among CEMA nations do not exclude the possibility that the member nations have their own national biotechnological programs. Thus the Soviet Union has had its own national biotechnological R+D program since the early 1980's and Hungary since 1984. In the GDR, Bulgaria and Czechoslovakia, their own plans are currently being developed.

Where Do We Stand Globally?

The production, processing, utilization and marketing of materials of biological origin has always been a significant factor in our domestic economy. Agriculture, the food industry and the industries processing biological source materials--including, in a broader sense, our pharmaceutical

industry with its outstanding results also on an international scale and the chemical industry--together provide nearly one-third of our national income. Aware of the global biotechnological R+D results achieved during the past 5 to 10 years, we could project for our domestic conditions that there will be a further increase in the proportional value of the biotechnological products and, toward this goal, we can and must be prepared for very active and concentrated R+D work and a coordinated development of production.

According to international experience, a precise definition of the goals is the primary base for the developmental strategy to be set up in the field of biotechnology. A further task is to balance the short and long range research plans and to guard against a misjudgement involving developments (changes) in market conditions. This means that, already during the research phase, close attention must be paid to sustained marketing activities.

In preparing our accounts of scientific-technical development during the years past--knowing our economic situation, strengths and the related global developmental trends--the decision was made that biotechnological development should not be comprehensive or broad based. By focusing a considerable part of our material and intellectual resources on a few related areas, first of all the development and application of new procedures, more competitive in the long range, must be promoted. To reach these goals, the government had accepted the proposal and program submitted by the OMFB [National Committee on Technical Development] on the basis of which, as part of the OKKFT [National Intermediate Range Research and Development Plan], a coordinated research project was started in 1984 within the program of "research and development, and utilization of biotechnological methods in agriculture and industry."

The regrouping and concentration of strengths needed to reach these goals was only partially achieved so far. In our country, R+D work involving some branch of biotechnology is being carried out at more than 40 institutions (research institutes, university departments, factories, agricultural plants). There are over 400 graduate scientists working in this field. This number represents only 1 percent of the workers engaged in the R+D section of the country and there is a very uneven distribution among the branches. In view of the broad range of biotechnology, a gradual expansion of the intellectual forces must be achieved in the future. Currently there are only 8 institutions with more than 10 research scientists. The largest and most significant among them is the Biological Canter of the MTA [Hungarian Academy of Sciences] in Szeged with basic research as its primary task. Similarly, the concentration of research topics is also widely dispersed. Large research institutes and departments are characterized by the greatest concentration. Research establishments with fewer personnel--and also research at pharmaceutical houses--are characterized by dissipation; there are more topics than research scientists.

In most of the basic research areas mentioned, the domestic standards are rather high, the results are well known in and taken into account by the international scientific community, and in some areas they are of outstanding significance. The number of the latter is not large; nevertheless, the Hungarian basic research scientists are highly esteemed globally and contact is sought with them for cooperation. For years, the Biological Center of the MTA in Szeged has regularly received and trained scientists from abroad.

Domestic applied research is generally at an average developmental level in the field of fermentation and enzyme technologies while it is of very high standard, also on an international scale, in the field of biotechnologies applicable to plants. With respect to certain modern trends in biotechnology (gene manipulation, cell and protoplasm fusion, cell and tissue culture) we have promising results which are expected to be more broadly applied in the near future (for example, resistant plant species, vaccine production and production of antibiotics).

The equipment (instruments, installations) and material supply of the research establishments is in general far behind the institutes doing similar research abroad. The equipment of several significant research institutes and industrial research laboratories is definitely poor. Successful work is hampered by the obsoleteness or lack of laboratory equipment. Large experimental biotechnological laboratories and new technological establishments have been completely lacking until now; within the last few months our government had approved the establishment of such a network. Thus the Applied Biotechnological Agricultural Research and Training Foundation of Godollo and the Biological Research-Development Park of Szeged were started; their task will be to transcend the laboratory-scale development for agriculture and industry. In addition to these two places for development we would need the establishment of at least 7 to 10 additional experimental establishments and larger laboratory R+D parks.

In the interest of utilizing the new results of biotechnology, the industrial expansion of certain production-technological procedures (product isolation, purification, etc.) is needed. Thus the establishment of new experimental plants and technological lines is a pressing task because without them the results achieved in the laboratory cannot be repeated and confirmed on a larger scale and the new technologies cannot be developed into practically applicable, economical procedures. To reach these goals, we have qualified experts with whom the foundations for advancement can be laid. We are in a considerably worse situation with respect to the financial and material requirements. In general we do not have sufficient capital goods for technological retooling or for the development of new production bases. In addition, changes are needed mainly in the fields of machine, equipment and instrument production. The biotechnical manipulations require new technical solutions and also, considering the limited foreign exchange possibilities, we must equip ourselves for the manufacture of the necessary equipment. Otherwise, in the absence of these conditions, we will be left permanently behind the level already achieved in biotechnology, both on the international stage and in domestic production, and our results will be wasted.

In accordance with the research and development plan, we are paying close attention to the establishment of "biological industries" based on the results of modern gene transfer, enzyme technique and cell culture, and also to the rapid further development and practical application of continuous computer-aided processes in domestic basic research in cell fusion, cell culture and gene transfer procedures. A prominent field among R+D activities is the gene tranfer technique, separation of the basic cell structures and general application of the methods of cell culture and cell propagation. By developing

the methods of animal and particularly of plant cell propagations, we wish to achieve an increase in the amount and effectiveness of plant and animal production and a more economical production of goods with improved quality and inner content.

The development of procedures which improve the genetic basis of materials of biological origin has begun. Significant research is being conducted using microorganisms and enzymes to enable the processing of the biomass and its more extensive utilization. In this context it is practical to develop production systems which optimize the utilization and recycling of organic materials. The advancement of fermentation processes has the primary goal of producing more effective drugs and developing new types of therapeutic and diagnostic materials.

Among the research-development tasks initiated in the framework of the OKKFT program and already producing promising partial results, the following can be mentioned:

- use of cell and tissue culture methods for agricultural plants;
- improvement and production of resistant plant species;
- development of biological methods of plant protection;
- elaboration of embryo transfer methods for agricultural animals;
- advancement of enzyme production methods for food-industrial purposes;
- application of the new technologies of vaccine production;
- production of antibiotics using biotechnological methods;
- production and application of diagnostic materials.

The successful accomplishment of these tasks, in part, has already brought significant economic results, and, in part, it will do so within the next 3 to 4 years. Noteworthy among them is that through the plant improvement activities, new Western markets were opened and deals were made amounting to a few million dollars a year. By developing a new type of propagation method for seed potato, or by vaccine production, several decades of capitalist imports can be terminated. Biological plant protection and the use of enzymes result in great material savings. The production of antibiotics and diagnostic materials is gradually producing new markets.

In addition to topics definitely oriented toward production and economics, great emphasis is placed on securing the intellectual and material "foundation" of biotechnology, first of all the training of competent engineers. The training of specialized biotechnological engineers through postgraduate education was started in 1984 at the Technical University of Budapest and in 1986 at the University of Agrarian Sciences of Godollo. In the framework of the program, special research training was organized mainly for young experts in industry who can learn the newest biotechnological methods from the leading research scientists in the course of a one-year training program. The two forms of training have 40 to 60 participants each year.

There is also increasing demand for biotechnological training during daytime university instruction. The Jozsef Attila University in Szeged has nice traditions for it but such type of specialist training is also improving at

the Eotvos Lorand University in Budapest and the Kossuth Lajos University in Debrecen.

We consider it important that participants of the program are supplied with up to date biotechnological information. Therefore, publication of a monthly reference survey entitled BIOTECH-INFO was started by the OMFB which also encourages the domestic publication of books involving biotechnological topics. The establishment and active functioning of a collection of microorganisms is also indispensable for research and for international partnership. The requisites for such an effort were also obtained and an "international depository institute" was set up at the Horticultural University.

On an international scale, compared to other fields, we lag most severely in the field of industrial application. The lack of capacity for industrial development, lagging technology and the paucity of suitable experts in development are retarding the rate of desired progress in spite of the achievements or successful patents recorded in certain small areas of industry. A considerable expansion of the intellectual, technical and investment resources is needed in order to enable us to utilize the emerging research-development results, on the one hand, and to still play a role in the market of biotechnological products, on the other hand.

In the practical application of biotechnological research results, greater than the industrial advances can be expected in the field of agriculture, plant culture and animal raising because the agricultural enterprises are more flexible and are more receptive than the industrial enterprises. In the course of this application, we can obtain plants and animals with new properties which make it possible to develop new products and processing methods either directly or indirectly. Domestic production and the satisfaction of domestic demand can be made more favorable and economical, and the foreign market possibilities can be better exploited through a targeted combination of the new genetic, enzymological and biochemical methods with the traditional ones.

In some specific areas of research and development, advanced cooperation between the socialist and industrially advanced capitalist countries is indispensable for the solution of our domestic tasks. Additionally, the plans include the joint manufacture of machines and equipment, and the purchase of licenses and know-how needed for domestic expansion. Dictated by our production interests, we should also strive to establish joint ventures whereby we could obtain not only financial backing and the newest technologies and information within a very short time but, in addition to better markets and smaller risks, we could also initiate our developmental activities starting at a higher technological level.

Expected Social and Economic Effects

Biotechnology undoubtedly represents a new trend in technical development. The research results are expected to be utilized faster because the practice of traditional biotechnologies and the level of technical-technological culture achieved are already providing a good basis for it.

What will be the effects and what will be the magnitude of reorganization in the individual fields of expertise, within the economic sphere in our country, caused by the application of the new technologies, is as yet difficult to predict. On the one hand, it depends on the financial possibilities of investments and, on the other hand, on the specific future requirements of agriculture, the food industry, the pharmaceutical industry, the biomechanical industry, human and veterinary medicine and environmental protection. Nevertheless, economic receptiveness must be considerably improved within a short time by increasing enterprisal independence and interests. Such an intention is manifested by the fact that the biotechnological central economic development program will be established in the near future which must contain all the tasks and conditions necessary for the entire chain of innovations.

With the extensive development of biotechnology, we can count on and, therefore, we want to discuss, a significant modification of the biologically oriented views of society. Application of the gene transfer methods, for instance, will reduce the currently excessive use of chemicals thereby reducing the danger of their getting into the food chain. At the same time, increased apprehension on the part of society can be expected because of more extensive interference with biological processes. Namely, many people fear that interference with living organisms will upset the balance of nature, in existence for ages, and a "genetic hell" will be let loose. We are convinced that such dangers need not be expected because, as confirmed over and over, the modified organisms and microorganisms produced by the gene transfer method are capable of living only under specific environmental conditions very different from normal.

Moreover, within the past few years, official permission to use new genetic methods, and new biotechnologies to make products, has become subject to considerably more stringent regulations in many countries. Much attention is being paid globally that the occasionally arising fear of society should not be based on uncertainty. Legal sanctions and experimental protocols have become more stringent not only in the research area but also in the interest of safety providing reassurance and proof of deliberate foresight.

In summary it can be stated that the experts are prepared for the research and development of new biotechnologies in our country. Our activities are attuned to similar efforts worldwide; however, we are lagging in receptiveness and, the monetary funds needed for development are insufficient. Nevertheless we hope that the coordinated domestic research program, the concept of the biotechnological central economic development program to be set up in the near future and, in conjunction, international cooperation will result in more rapid development. We also hope that biotechnology will acquire that level of relative importance in the areas of biological industries, more effective agricultural production, health care delivery and therapy, that is an essential future requirement for our economic development.

2473
CSO: 2502/16

CSSR, WORLD ROBOTICS TRENDS COMPARED

Prague TECHNICKY TYDENIK in Czech 26 Aug 86 pp 2, 6

[Article by Engineer Bedrich Chodera: "Robots Today and Tomorrow. One of the Conditions of Integrated Automation"; first paragraph is TECHNICKY TYDENIK introduction]

[Text] Sixty-one years have already elapsed since the world first encountered the word "robot," in Karel Capek's play "Rossum's Universal Robots." Today we hear this word more and more frequently. It applies to universal technical systems that are able to replace man in tending machines. Their mobility and intellectual capabilities are limited for the time being, but are being perfected through continual development.

World Trends in Robotics

The period of building first-generation robots with teach-and-repeat program control is ending. Second-generation robots, with adaptive control and (optical, touch, etc.) sensors, are gaining ground increasingly. Such robots are able to identify a part, determine its position and orientation, and use the established data to modify the program of a technological operation or manipulation. Work is beginning on a third generation of robots that will have artificial-intelligence components and will make decisions independently regarding their own operations, on the basis of stored data and comprehensive information gathered from the environment, with the help of better, intelligent sensors. It is assumed that these robots will be mobile and will employ new kinematic principles of motion. (See, for example, the article on robots in agriculture, in the No 51-52/1985 issue of TECHNICKY TYDENIK.)

Close attention is being devoted to the robot's payload (load-handling capacity) in relation to its weight. The point is not merely to make the robot's arms and drives lighter, but to enable it to lift and move also heavier loads, fairly fast yet accurately, which up to now has repeatedly raised demands for designs of sufficient rigidity. It appears that in future specifically the sensors will make it possible to reduce the rigidity of the robot's arms, and the accuracy of positioning them, to such an extent that an incremental displacement will complete the positioning of the end effector, under the supervision of optical or ultrasonic sensors. The objective, then, is not only to bring the robot's payload-to-weight ratio closer

to the similar parameters of living organisms, but to also duplicate the principle on which control of the extremities of living organisms is based, where vision and touch correct the errors in motion.

The robots' flexibility is being increased further. They are being equipped with a set of end-of-arm tools, and with grippers that often are double ones. The requirements regarding operator qualifications are being reduced by introducing the so-called teach method. Here a skilled worker performs the entire sequence of operations on the first product; the machine remembers the sequence and is able to further optimize it.

The constantly gaining integration of robots into CIM systems constitutes a separate chapter. Here it is necessary to perfect communication among the control system, the robot, the control systems of the cooperating production equipment (machine tools, and perhaps other machines), and the peripherals (mobile robots and manipulators). And all this must be interconnected with the control system of the shop or plant. Today there already exist systems that are linked to computer-aided design (CAD) systems, the data from which are transferred to computer-aided manufacturing (CAM) and computer-aided production planning (CAPP) systems. Everything is processed and decided automatically, without human intervention but under human supervision. If this embryo of completely automated industrial production is to operate reliably, the various manufacturers of the different industrial robots, machine tools, other production equipment and peripherals must agree on some standardization of the systems' individual functions and their communications signals. This thankless and extremely demanding task is now being handled by the No 184 technical committee of the ISO.

More than 50 percent of the robots built to date have been equipped with hydraulic drives. This type of drive is fast and fairly accurate, has an adequate payload and can dispense with mechanical gears. In spite of this, there is a growing preference for electric drives, usually dc servomotors with harmonic speed changers, and even with frictionless screws for accurate rectilinear motion. An electric drive is more compatible with an electronic control system. Furthermore, the auxiliary hydraulic unit and the entire oil system can be eliminated. Oil under pressure is always somewhat hazardous (there is always danger of fire or explosion). Therefore the standards of some countries do not permit robots with hydraulic drives for any hot operations, including welding; not even if the hoses are replaced with rigid lines (for they, too, may rupture). Therefore robots with pneumatic drives are maintaining a certain share of the total number of robots, but the future definitely belongs to electric drives free of mechanical gears. In Japan there is now an intensive effort to develop linear induction motors for this application, and step motors are also being considered.

Will Silicon Help Once Again?

Changes of position along rectangular paths are encoded by inductosyns; and turns, by incremental sensors or resolvers. Close attention is being devoted to force sensors, used especially as tactile (touch) sensors, integrated in some instances on a silicon chip. It is possible to fabricate in this manner also optical, temperature and pressure sensors. Charge-coupled devices are

being used successfully in optical sensors (produced as linear arrays in the GDR, and as two-dimensional arrays at Tesla in Piestany). Silicon's temperature resistance coefficient is practically linear over a wide range, from -55 to +150°C, and some foreign firms have been making silicon sensors for temperatures of up to +300°C. Vibration, shock and acceleration sensors can also be fabricated from silicon, by micromechanical processes. For example, a West German subsidiary of Texas Instruments is making silicon pressure and acceleration sensors. Silicon diaphragms can operate on the principle of either piezoresistance or piezocapacitance. The attained pressure range is 700 Pa to 70 MPa in the first case, and from as low as 70 Pa to 70 MPa in the second case. Sensors for high-temperature applications are fabricated from GaAs. Prototypes have been developed of fiber-optics pressure, acceleration, rate-of-rotation, and temperature sensors. Their expected application will be in integrated-optics devices.

Robotic vision systems are undergoing comprehensive development, with computer processing of the image and various methods of not only recognizing the outlines and shape of an object, but perceiving its depth as well. The success of these methods depends to a considerable extent on the quality and type of control system. The specifications that a robotic control system must meet are becoming ever stricter. The control system must be able to integrate the signals from several sensors (perhaps even sensors of different types) endowed with some intelligence of their own, and it must also be compatible with the control systems of the machine tools and other production equipment.

Application Obstacles, Human Factor

What is the main obstacle to robotization? Are the causes objective or subjective? What must be done to remove them? Answers to these questions are now being sought in many countries of the world, and valuable experience is accumulating. The first robots appeared already in the early 1960's, but only the advances in microelectronics accelerated significantly the rate of robotization. Especially microprocessors have opened never imagined opportunities.

The situation is unambiguous. Without robots, industrial production would no longer be able to compete, causing the entire economy to lag. In 1990, according to data that are frequently cited but difficult to verify (because a uniform definition of a robot is lacking), there will be 60,000 robots producing in Japan, 15,000 in the FRG, and about 5,000 to 6,000 in Sweden, England and France. That same year the United States will already have 350,000 robots installed. The Principal Directions of the Soviet Union's Economic and Social Development that the 27th CPSU Congress approved likewise calls for a considerable acceleration of the rate of robotization and integrated automation. All this will produce important changes in the structure of engineering production, with grave social impacts. After the year 2000 (a mere 15 years hence), the demand for blue-collar production workers is expected to decline to 20 percent of their present number.

Changing the present mode of production is not easy. Everywhere in the world we encounter indolence, conservatism, a clinging to methods that have been

proven and ingrained for years. But the economic situation is exerting inexorable pressure even in countries where wages are relatively low, such as Japan, for example.

Robotization is the most advanced in the automobile industry (welding, painting, and assembly). The "Robot 9" Exhibition in Detroit last year demonstrated how robots have penetrated the electronics industry. Robots of the SCARA type, with jointed horizontal arms, have been adapted to mounting electronic components on printed-circuit boards. Assembly robots are emerging as a separate class, with properties somewhat different from those of robots for manipulation and technological operations. Here great emphasis is placed on positioning accuracy and fast acceleration, while maximum speed, reach and mobility are less important. Robots have been the most successful overall in the engineering sectors. It is reported that they have raised labor productivity by 35 to 40 percent! The greatest reserves appear to be specifically in assembly where only 20 to 25 percent of the operations have been mechanized, and the rest are being done manually. A huge field of application comprises the nonengineering industries and branches where hard and heavy physical labor has to be eliminated in the mines, forests, construction, agriculture, etc.

The obstacles to introducing robots are not only economic and technical ones. In addition to the inertia of mentality, there is also fear of losing an advantageous job classification, the prestige and recognition due to a skilled worker; fear of having to undergo retraining when one is no longer young, etc. These fears can convert into entirely real endeavor to hold up the progress in research and development for at least a few more years. In their consequences, such fears are detrimental to the interests of the enterprise and to those of entire society as well. This is why so much emphasis is being placed on the timely retraining of existing cadres; and, of course, also on training a sufficient number of young specialists who are not encumbered by traditional practices. In Bulgaria, for example, youths are being trained for their future occupations from childhood on. Schools have been equipped with suitable types of personal computers, and now the production is being developed of suitable educational robots and miniature flexible manufacturing systems that are controlled by minicomputers.

In the next 15 to 20 years it will be necessary to solve also certain pressing psychological and social problems. People and robots will be working side by side in the factories. But this will not involve merely the supervision of the robots' work. In the factory halls and corridors, and along the walkways, people and robots will be meeting more and more often, each one hurrying to attend to his or its assigned tasks. An interesting question was raised at the EEC's "Industrial Robotics 86" seminar in Brno last February: How will blue-collar workers, with little or no experience of robots, relate to these intelligent machines as the latter pass by to attend to their assigned tasks, about which their environment will not be informed in detail? Even though man-machine communication will certainly attain a higher level than at present, it is difficult to foresee at present all the things that specifically psychology and sociology will be called upon to solve.

Controversy Over Concepts

A robot is an expensive piece of equipment (everywhere in the world), and it pays to install one only in the three-shift or continuous operations where a substantial improvement will result in labor productivity, product quality, and elimination of work that is tedious, difficult or injurious to health. Isolated robots amidst conventional manufacturing are successful only exceptionally. The favorable results are evident especially when robots are installed in groups. It does not pay to robotize short-lived or obsolete technologies.

Success depends also on choosing the right type of robot. From the user's point of view, robots may be classified into stationary robots, portal (overhead) robots, and integrated robots (integrated with the production equipment, for example). Robots belonging to the first class (in Czechoslovakia the PR 32 and PROB 10, for example) tend one or more machines that are within reach of the robots' arms. The portal robots and manipulators (the M-63 and AM-20, for example) do not take up so much valuable floorspace and do not block access to the machines The portal manipulator's travel permits multistage tending. It appears that portal robots and manipulators are finding successful application also with machine tools whose manufacturers have preferred integrated robots or manipulators up to now, with the arm attached to the machine tool's frame (for example, the robots built under license from FANUC of Japan and installed in the work cells supplied by the 3M plant in Sofia). It is pointed out that a portal robot or manipulator offers the advantage of feasibly combining its control system with the controls of the production equipment, into a single unit.

All three concepts are being implemented for the time being, and it is not discernible as yet which one will prevail in the end. A contributing factor in this respect is the differentiated approach of robot makers and of the manufacturers of production machinery. For the former, the machine is merely one of the robot's peripherals, operating with the robot only during a part of a work cycle. For the latter, the situation is the exact opposite. Many scientific teams in the world are striving to develop an anthropomorphic robot, and undoubtedly they will succeed in the end. But how expedient will such a robot be in industrial production? Although it will be able to operate any machinery designed for human operators, its complexity and intelligence will necessarily be redundant for these functions. Therefore the opposite approach is being considered as perhaps the more effective: design the new production machinery so that a robot can operate the machine by electrical signals. All ergonomic considerations will be absent from the production machinery of the future. Unlike up to now, the functional parts of the machines will not be designed with the reach of the operator's arm in mind, to provide convenient controls, for example. After all, the robot can load the machines either close to the ground or high above waist level, depending on what is the most advantageous for automated manufacturing.

Planned Tasks

The basic tasks of State Target Program 07 (Industrial Robots and Manipulators) were fulfilled successfully under the 7th Five-Year Plan: 1,962 robotic work cells were equipped (457 more than what the plan had called for),

4,333 industrial robots and manipulators were installed (1,224 more than planned), and 4,742 industrial robots and manipulators were built (1,197 more than planned). Under the 8th Five-Year Plan, pursuant to State Target Program A 05 (Robotization of Technological Processes), at least 3,758 robotic work cells are to be equipped with 7,000 robots and maximally integrated into robtic technological complexes. Robotic work cells are to save their users 10,000 workers by 1990 and reduce costs by 1.6 billion korunas. By introducing the production and supply of robotic work cells and complexes, manufacturers will increase their profits by 220 million korunas a year on average. The plan also calls for equipping at least 2,370 robotic work cells under domestic and export turnkey contracts.

The following tasks of the State Research and Development Plan are also parts of State Target Program A 05: Installation of Industrial Robot Groups (for manufacturing pumps, two-dimensional forming, building railroad cars and electric motors, and for machining parts that are flanged, box-type or solids of revolution); Modules for Building Industrial Robots and Robotized Complexes (e.g., for automated assembly, welding, the development of modules, components, transducers, sensors, diagnostic aids, materials handling equipment, etc.); Robotized Technological Complexes (the systems aspects of development, and the questions of repeated manufacturing); Robotized Complexes in the Building Materials Industry (for the production of bricks, and ceramics); and Control Systems for Intelligent Robots and Robotic Work Cells (development of functional models and prototypes of control systems, artificial-intelligence components, and the questions of the architecture of robotic control systems). VUKOV [Research Institute of the Metalworking Industry] in Presov is the coordinating institute for the above tasks, with interindustry authority. Organizations of the three engineering ministries, Czech and Slovak ministries of industry, Czechoslovak and Slovak Academies of Science, the higher educational institutions, etc. are participating in the solution of the aforementioned tasks. There is also significant multilateral and bilateral cooperation with CEMA countries, through the Robot International Scientific and Technical Association headquartered in Presov, and on the basis of additional agreements concluded with Bulgaria, the GDR, Poland, Hungary and Romania.

How to Mass-Produce Robots?

The recent "Robot 86" Exhibition in Brno has demonstrated that we are in the forefront of world technology in the development of robots, manipulators, robotic work cells and complexes. In this context, who would not find gratifying the favorable comments by foreign participants at the EEC-sponsored "Industrial Robotics 86" seminar held in Brno in February, suitably combined with the exhibition? Professor J. Knight of Nottingham University (Great Britain), for example, had high praise for the technological level of the presented designs.

On the other hand, one cannot fail to see that--with few exceptions, notably ZTS [Heavy Engineering Works] in Martin, and CZM [Czechoslovak Motorcycle Works] in Strakonice--robots are still being piece-produced, in every case as a sideline to something more important. A decision to establish a robotic work cell or manufacturing plant still involves a long adventurous journey

lasting several years, in the course of which the robotic systems integrator bears practically the whole burden of responsibility for the solution. If he is lucky enough to obtain a robot or manipulator of a suitable type, he must supplement it with peripherals he himself builds painstakingly, and must cope with the problems of low reliability and efficiency that stem from unsuitable investment regulations. Therefore it is no wonder that an enterprise wishing to modernize its plant and equipment, and able to look around in the world, will accept the bid of a foreign firm that is able to supply the complete system within a few months, with warranties, and to provide fast and reliable servicing. And these bids are from firms which have begun to build robots and robotic work cells much later than we did, and whose products do not differ significantly from ours in terms of their technological level.

This contrast between the technical and the economic possibilities of our engineering to develop top-of-the-line equipment, but without subsequent mass production based on the supply of a wide range of assembly modules, is very obvious specifically in the sector of industrial robots and manipulators. (But the robotic sector is not unique in this respect, and we are also having similar difficulties with some types of computer hardware.) On the one hand we have research and development organizations that are in the forefront of their field. And on the other hand we are unable to supply the demand that will increase constantly, especially after modernizing and automating the manufacturing operations and plants that involve heavy physical labor and are injurious to health. The product-information personnel in the booth exhibiting painting robots said that their output was practically sold out for years in advance. Also our other manufacturers gave similar lead times on new orders.

Just as in the other sectors of our engineering, the key to mass-producing industrial robots and manipulators in our country lies in substantially and radically improving the situation in the sectors supplying parts and subassemblies, in the components base, in the production of standard systems and parts. Without solving this basic problem, we cannot hope to successfully mass-produce any demanding and technically advanced product. And this applies to industrial robots and manipulators as well.

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ARGENTINA'S EFFORTS IN BIOTECHNOLOGY SUMMARIZED

International Meetings

Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA in Spanish Aug 86 p 42

[Text] The National Biotechnology Program of the Department of Science and Technology has sponsored two international meetings on biotechnology. On 28 and 29 April 1986, the Argentine-Brazilian Forum met in Buenos Aires; in May the Franco-Argentine Conference on Biotechnology met for a week. Both meetings were attended by noted Argentine scientists, along with government officials and businessmen, who discussed this field with their foreign colleagues.

The Argentine-Brazilian Forum on Biotechnology, a direct outcome of the renewed relations between the two nations after the summit meeting between Presidents Sarney and Alfonsin when they officially opened the Tancredo Neves Binational Bridge, was chaired by Dr Manuel Sadosky, secretary of science and technology, and by Dr Renato Archer, Brazil's minister of science and technology.

At the opening ceremony, Dr Sadosky pointed out that "the development of independent, modern and competitive biotechnology is an essential ingredient in Latin America's modernization program." He then said: "We have before us a promising undertaking, but it will not be an easy one; there can be no competitive, groundbreaking biotechnology which can generate new resources unless it is based on bold, original and innovative work in biology."

"Our Argentine universities," he added, "along with our research centers, must become nuclei spreading out new and meaningful knowledge, and our businessmen must learn the language of science so they will be able to make use of this knowledge."

Dr Archer said there have been significant advances in bilateral cooperation in biotechnology for, "spurred on by the institutional support of the scientific-technological system of both nations, our businessmen have reached a series of implementation agreements which put into practice the ideas our governments have expressed at international meetings." In this context, he

mentioned the conclusions reached by the Conference of Science and Technology Ministers for Latin American and Caribbean Development. "The Third World nations," he added, "must be prepared to face the new situation created by technical and scientific progress, which is coming to be a dominant element in wealth and power."

The Brazilian minister concluded by stating that "the greatness of our destinies as sovereign nations depends to a large extent on our ability to understand the challenges which lie ahead of us. Cooperation, rather than an option, is being transformed into a necessity which our 'born-again' democracies will transform into a factor for peace and progress."

The Franco-Argentine meeting was held at the Telecommunications Museum in the southern part of Buenos Aires. Its principal objectives were to help to develop the new potential offered by modern biotechnology in a number of industrial sectors, while trying to interest Argentine companies in participating in this development, and also to promote agreements between businesses and research centers of both nations. Thirty companies took part in the forum with Brazil; 60 participated in the Franco-Argentine conference.

Dr Sadosky spoke at the opening ceremony. He defined science as a factor with "an important social function." He also noted that "we are trying something new, in bringing together different sectors of the government with production and with scientific research."

Later the French ambassador, Antoine Blanca, spoke of the importance of this meeting for France. He said that relations with the new democratic Argentina can not be the same as they were with Argentina under the military regime. He then said: "We would like to be witnesses of Argentina's scientific rebirth."

Dr Sara Rietti, staff adviser of the department of science and technology and of the National Biotechnology Program, also spoke.

Biotechnology and Development

Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA in Spanish Aug 86 pp 45-50

[Speech given by Dr Sara Rietti at the Franco-Argentine Conference on Biotechnology]

[Text] Because of her knowledge of scientific and technological policy in this field, and of the work of the National Biotechnology Program in recent years, which forms the basis for the significance of these international meetings, we are including here the text of Dr Sara Rietti's speech at the Franco-Argentine Conference on Biotechnology.

First of all, we would like to make it clear that everything being discussed here represents the work of a group which has forged an identity of thought through its shared endeavors. Hours of thoughtful discussions, which were heated at times, support the courses that have been adopted. Today, in addition to being a working group, we also take pride in being a group of friends, and of being able to glimpse the first results of our work.

The National Biotechnology Program of the SECYT [Department of Science and Technology] in the Development of this Field in Argentina

The branch of science and production now known as biotechnology has a background in Argentina in both production and science, which predates its inclusion not only in the SECYT's activities, but also among the interests of producers, planners, and organizations in recent years.

We are referring first of all to developments in productive activities taking place now, or which have already occurred in the past. This has become customary in a country with a strong agricultural production like Argentina's, with a relatively large and well established food industry, as well as industries producing medications for both human and animal health.

And secondly, in relation to academia and research, my reference is directed toward the particularly active development of the biological sciences, which have a rich tradition in Argentina. This represents a basic fund of knowledge which we can now tap for the development of biotechnology. This doesn't mean that we are in an especially good position now; I am rather pointing out just where we are starting from as we face our current development program.

In December 1983 we inherited the interest in this field that had found expression a year earlier with the creation of the National Biotechnology Program. This means that at that time we received a recent program, which we then decided to revise with the active participation of members of the scientific community, representing different state research laboratories as well as a few private labs. They indicated various possible courses of action which could be followed.

We are speaking of a very young program with a history of less than 2 and 1/2 years, a short pre-history, and a lengthy background. In the short history which we share with the program, there was a first phase of establishing positions in relation to the issues. This meant making decisions about the priorities to be assigned to biotechnology in relation to our economic, social and productive situation.

We set the program up with an executive secretariat composed of two members (today there are four), and an advisory panel chaired by Dr Leloir, composed of scientists from different areas, some of whom also work in the private sector.

For the Department of Science and Technology, the development of biotechnology appeared to offer new productive potential based on recent developments, and at the same time, as we have already said, it seemed to have a scientific potential which could be developed within a relatively short period of time. For these reasons, it appeared to offer a special opportunity and challenge.

So from the very beginning it received special attention from the secretary, Dr Manuel Sadosky, who has maintained coordination with the area for which I am responsible under his direct supervision.

As we said, and as was also true in other advanced areas, this was a challenge, especially in relation to its growth potential, which marked it as a desirable and possible development project. We had to balance our economic difficulties, problems of stagnation and low industrial development, against our rich human potential and our genuine aspirations.

At this point it seems worthwhile to repeat an idea which guided our work, about what are called the advanced technologies and their role in relation to an independent technological policy, recalling that this is one of the controversial themes in our recent political and cultural history. We must also remember that 8 years of silence had elapsed, during which positions were not brought up to date in light of new domestic and worldwide situations. We were not avoiding the issue, but rather trying to reintroduce thoughtful discussions about it, so that we could make a selection, and not have a mere economic imposition or imitation of a fashion.

In following this course, we came to the conclusion that advanced technologies no longer have a pejorative connotation in relation to a policy of growing autonomy, and actually take on positive value in carrying such a policy forward when they respond to or are in agreement with the basic knowledge that already exists, when they have the potential to be developed in our laboratories, and when they also reflect the true needs of production within the framework of a national project. When, in addition, that production can absorb technologies acquired from or shared by other countries, not from closed package deals, but rather through assimilable developments which can be adapted and improved locally; and when the acquisition of that technology does not compete in a negative manner with the consolidation and modernization of traditional production, but on the contrary, helps to modernize it by reinvigorating the system.

In that case there is no longer any sense in dividing technologies into desirable and undesirable, based on a black and white sort of classification; the dividing line follows a very complex path and depends on variables like the ones we just mentioned. Moreover, through their products the technologies of interest to us will invade our culture, will influence our production, will determine the balance of trade. In a world in close communication, with international trade with its present features, with expectations

of growing populations which will become increasingly cosmopolitan, with strong ties between nations, certain aspects can be regulated, specific courses can be promoted and guided, but only by going along with the tide that will bring scientific and technological developments into the future of our peoples.

For this reason, we concluded that while we should not accept catastrophic proposals or magical solutions, we must be prepared to absorb and adapt to the needs of our society, those developments which are invading and shaping that society.

In this context, which called for retracing some steps, outlining others, rejecting prejudices and ready-made ideas, and rethinking many things in new lights, we considered an emphasis on the considerable capital we have amassed in our scientific-technical system to be a central objective of our actions in relation to biotechnology. As we said earlier, we do have a tradition in fields related to this area. We therefore wanted to make this a mobilizing element of production, whether industrial, agricultural, or service-related.

In the specific case of biotechnology, whose scientific-technical content is quite high, where the transition between research and production is more immediate than in some other fields, and in which an exaggerated separation between basic and applied science becomes meaningless, in this case, then, a fundamental resource for its development derives from this capital.

Based on these concepts, we set to work. Above all, we rejected grandiloquent proposals, staggering investments, and the creation of new groups and structures. In the first phase we proposed to support programs already in existence, to upgrade and interconnect them, give them shared objectives, and begin to weave the tissue of biotechnology, which we wanted to make broad enough to cover many fields which could then in turn lend their support to the field of biotechnology. Since this was technology related to biological processes, we preferred a development more like that of a living tissue than the construction of a mechanical structure with juxtaposed parts. It was not a highly complex structure or even high-tech equipment that would sustain biotechnology (at least not in the economic, political and social situation we had to deal with); nor were superstructural agreements with international agencies going to determine our beginnings.

That might be, and still may be of use in circumstances other than those we faced at that time.

In the tissue we were cultivating--this figure of speech is of use for discussing this concept--we knew that a vital and catalyzing force was the connection with existing production and with potential investors and producers.

We also knew then, as we do now, that it isn't easy to interweave the scientific-technical system with production; there are factors such as a mutual lack of confidence, a record of failed attempts, and misunderstandings about the roles of each party. All these generic problems were compounded by those arising from the particular situation we faced at that time: the lack of confidence on the part of the Argentine business community, their economic problems, the process of deindustrialization which the nation had undergone, and the substantial decline in research and development in businesses, which had occurred as part of their general cutbacks.

We would like to point out that this insistence on the role of production is not just an erratic whim like the one some years ago, when in the midst of a deliberate policy of destruction of the manufacturing apparatus and of disruption of the universities, programs promoting technological development were announced.

In our case, the production profile forms a foundation for the policy we are promoting, increasingly meshed with the production plans for goods and services emanating from other government departments, such as industry and foreign trade, agriculture and livestock, and health and social action.

For such a scientific policy oriented toward the development of biotechnology in our nation not to be a luxury and a fantasy invented by planners, for a strategy promoting growth of the scientific-technical structure to be meaningful, it must be properly positioned and connected with the development of production, for it is the business sector that will ask for and ensure the emergence of the human resources which our sector is promoting. Up to that point this link is crucial, if we are to carry out a government action that does not drift about in a vacuum, that takes its place at one of the angles of the triangle, a triangle completed by research and production, which will be supported by a real policy of growth and modernization.

And we can say this now, for at this meeting, as the result of a deliberate action, we have 60 Argentine businesses represented, of different sizes, working in different fields, but all interested in this topic, sitting beside 80 scientists who represent almost the same number of groups. All of them were drawn to this conference, for both parties want to establish closer ties.

At this moment I can not fail to remember with emotion two Argentine thinkers, now dead. Part of their expectations about planning for the nation's goals have found expression in many of the things we have been saying here. I am referring to two of our great teachers, each of whom had his own style: Jorge Sabato and Oscar Varsasky.

Without having specifically sought to do so, today we must give our first public accounting. Many times in the past we were asked to do this, and we avoided it. It isn't easy to produce visible results in the short term, for

we chose to grow "biologically" (to use that image once again), without yet having developed the technique for "in vitro" cultivation of these cellular fabrics.

Now I will offer a brief report on our work: what we have already said, plus some information arising from what is being described, forms the framework for our program's actions.

For somewhat less than a year we have been able to inject discretional funds in this area. This reflects its level of priority. This has been done in the midst of great economic hardships, but it has also been done in accordance with strict selection criteria which so far have not been questioned. We are receiving responses showing that the scientific community has received a signal of support and an informational signal. (Among these responses was the massive outpouring of interest in this meeting; we were unable to accept all the applications for participation we received both from scientists and from the business community, for both easily exceeded our expectations about the level of response we might get).

We have also sent out informational signals to businessmen, indicating our determination to facilitate by all possible means a linkage between research and production. Dr Carlos Abeledo, a creative force behind this policy, will speak later about these guidelines and about what has been accomplished in this area, in terms of agreements between institutes and members of CONICET [National Scientific and Technical Research Council] and manufacturing companies. Just yesterday a good agreement was signed between CONICET, on behalf of its scientists, and an association formed by SIDUS, a pioneering firm in biotechnology, and a large company, which has not yet been involved in the special application of scientific and technological developments.

This agreement forges one more link in the business-research relationship and also creates a connection between a dynamic small or mid-sized Argentine business with a focus on research and development with a large company. Such associations are becoming important all over the world, and are now beginning to take shape in Argentina as well.

In addition, we are promoting an institutional relationship with businesses which have direct or potential ties with biotechnology. For this reason, we have instigated a survey, now being conducted in our name through the cooperation of the VILMAX Foundation and of its chairman, Dr Mazza, to whom this meeting also owes a good part of its physical organization. Through this initiative, we are promoting the formation of a group to bring businessmen together so they will be able to handle this relationship successfully and smoothly. This program has moved along well, and its chairmanship has been offered to the head of the Provincial Bank, Dr Aldo Ferrer, a dedicated and active advocate of the inclusion of the scientific-technological variable in the development process. This also suggests the leadership role which the bank has played in this process.

It is important to say that we know that Argentina has a biotechnology industry that is barely in its infancy in terms of current thinking about this field, but we do have a valuable business and manufacturing tradition, as well as a growing commitment to this area, which encourages our efforts.

At the Argentine-Brazilian Business Conference which was just sponsored by our program, we were able to talk with over 30 businessmen who are either active or interested in this field. There was also a large delegation representing Brazilian businessmen.

We attach great importance to scientific and business cooperation between our two nations, particularly in the field of biotechnology, which we imagine will be especially fertile. We consider the alliance a small nucleus which will reach out toward other Latin American countries and toward more highly developed industrialized countries such as France. We are interested in beneficial tripartite alliances--Argentina, Brazil, France--and for that reason we specially invited Dr Torres de Carvalho, Brazil's secretary of biotechnology, who has recently worked with us, accompanying his country's business delegation to this meeting.

We have here with us many of the Argentine businessmen who attended the earlier meeting with Brazil, who are now interested in establishing business ties with France, and in its technological contribution.

At both meetings, Argentine businessmen, while they considered associations with other countries, were also meeting with scientists who represent, along with their labs, the greatest capital resource we have for any technologically advanced undertaking.

We have mentioned catalyzing activities in the scientific field; then we spoke of ties with the business community. We think that these two lines of action, by interacting, will become axes of a realistic government policy to promote the development of biotechnology.

From the knowledge which the manufacturing sector will acquire from the scientific-technological system, and vice versa, demands on the system and a stimulus for product development will arise; this is already starting to happen. This will call for greater efforts from the state for training human resources and devising growth strategies, but we do expect that the present and future development of biotechnology will be more and more sustained by the private sector, through financing of state research as more use is made of that human and physical capital we have already mentioned, and perhaps just as important as this, through the incorporation of research and development in the private sector, another fundamental pivot of this tissue that is of interest to us. All of this must be supported by a system to promote biotechnological industry that is based on these key aspects.

Today, at a time when we our drawing up our accounts, we now take pleasure in announcing that, along with the deputy department of industrial development, we have agreed to form a fast-paced working group which will define the bases for such a promotional system. This will be done within a short-term period; its precise time frame still remains to be determined.

The establishment of this group marks the achievement of a stated goal. A little over 6 months ago we in the department of science and technology contacted the areas of the government that are most immediately involved in biotechnological production or research. These departments included: industry and foreign trade; agriculture, livestock, and fishing; and health and social action, as well as research organizations such as CONICET, INTA [National Institute of Agricultural and Livestock Technology], and INTI [National Institute of Industrial Technology] (we did not have an organic link with the universities, though we are in close communication with them, for at that time they were engaged in the normalization process). The idea was to move forward with a National Biotechnology Commission that could generate a sort of Mobilization Program, similar to the French organization. We held two meetings at which agreements and joint lines of work were hammered out, which we are now proceeding with; we also created a fluid line of communications that is reflected by the officials now present here. Some changes in government staff and perhaps our limited ability to manage such an undertaking have delayed its implementation. But with the biological style which we prefer, we believe that the tissue that will nourish such a realistic program is now being formed. One sign of this is the formation of the working group with the deputy department of industrial development to form a promotional system, as well as the role assigned by INTA to the National Biotechnology Program and to CONICET in creating a cooperation program looking toward the future, with its French counterpart, the INRA [National Agronomy Research Institute].

In relation to the program's specific activities of promoting research and development projects, we began them essentially in the fields of human and animal health, where we already had a considerable tradition of scientific and productive work, and from which we have received the stimulus of pioneering businessmen who want to revitalize this area.

We are exploring almost simultaneously the area of biological nitrogen fixing, for which we are organizing the first working subcommittee. On this topic, please allow me a digression, for we have the enormous privilege of having our Nobel Prizewinner, Dr Leloir, serving as a member of this committee. Dr Leloir is offering his valuable example and his innovative spirit to the area of biotechnological applications. This is a trend which we might term cultural, which carries enormous weight in our scientific and productive circles.

Since we have mentioned the Nobel Prize, we must not fail to speak of the inspiring and unique role played by our periodic contacts with Dr Cesar Milstein, as well as with a great number of scientists located in prominent

positions abroad. As part of the French delegation, we have the Argentine scientist, Dr Falcoff. And we don't want to overlook our first Nobel Laureate, in chronological order, Dr Houssay, during the centennial year of his birth, for he helped to lay the foundations for the development of our biological sciences. This is not merely hollow praise; it is part of a deliberate action of integration, of trying to bring positions closer together, of creating our frequently mentioned biological tissue. This is essential for any human achievement, especially in a country which has suffered from so much isolation.

Continuing with the course of the Biotechnology Program, we could mention the formation of the lactic fermentation group, of the plant health group, and of the nonsymbiotic nitrogen fixing group.

While on the subject of these groups, we would like to point out that the course of the program was profoundly influenced by the plant biotechnology meeting held in Rosario in November 1985. There the first organic contacts between scientists working in allied areas, and between them and the Biotechnology Program took place, with the stimulating presence of businessmen interested in various aspects of this. This is crucial for an agricultural exporting nation, one which supplies its own food, and which should increase its forestry production, to mention just a few aspects of interest.

At that meeting four areas for joint work were set up, which in some cases received economic support practically immediately. There too our weaknesses in the area of plant biochemistry became apparent. That is related to one of the Biotechnology Program's priority concerns: the training of human resources in the various areas under development.

At this time we are starting to work on strategies to define and support an initiative to create a degree program in plant biochemistry at the University of Rosario, to be centered around some excellent research groups in biochemistry and microbiology.

We will try to coordinate this program with another complementary program at the University of Mar del Plata, which will lead to a graduate program in this field. This is just one limited example of a human resources policy that we want to accentuate, and for which cooperation with France is essential. The example we are citing leads in the same direction as the final item we want to talk about--the critical size for advanced research programs and its relationship with a national program aiming toward decentralization and regionalization, which is today acquiring a priority nature, through our movement toward the south, with the transfer from the federal capital to the city of Viedma.

We mentioned a short time ago that at the start of our work, we rejected already prepared projects that rank the risk of intensifying the concentration

that routinely occurs in Buenos Aires, by placing practically all the power granted by this knowledge in a single group. We were aware, though, that a certain critical size is necessary if research in these areas is to begin to yield tangible results.

We would rather sacrifice a certain amount of spectacular efficiency, while compensating for the difficult beginnings with increased coordination among the various related groups and with the promotion of joint endeavors, while trying to foster growth in a considerable number of active centers in different parts of Argentina. These may be based around older groups or around new embryos which offer promise of productivity.

Our intention was clear; it was stimulated by a consideration of the influence that a solid research group can have throughout a region: on university life, the training of human resources, on local production, and even as a cultural focal point, viewed in a very broad sense.

Today we are pleased to see some promising groups--or seeds of such groups--in Salta, Rosario, Mar del Plata, Cordoba, Bahia Blanca, Corrientes, Puerto Madryn, Balcarce, Tucuman, and Buenos Aires, of course; and we are certainly forgetting some points in our large country. We have here representatives of all these groups, who want to work together in solidarity, often with manufacturers, or considering the needs of local services; through joint projects, these groups are often capable of taking on complex projects; of providing leadership for university degree programs in specific areas; and all of them will form a fabric of laboratories all throughout our country, which will promote the true sovereignty of the future, one which is allied to the responsible dominion of science and technology.

Finally, I would like to devote a few words to the importance that we attach to our relationship with France in the development of our National Biotechnology Program.

The ambassador of France, the members of the scientific staff of his embassy, Mr Merian and his colleagues, and earlier Mr Daniel Haiza, who initiated these actions, are very well aware of the importance we have attributed to this relationship in various fields of our activity, ever since the start (and even earlier) of our work.

With France we are conducting a very active and innovative advanced training program, which we take pride in having helped to design. It entails France's support for the development of 15 doctoral programs in areas which call for special efforts. We now have nine of them in full execution, and at this time, as part of this conference, we will consolidate the forms of cooperation that will help to accelerate our human resources training in areas related to biotechnology, by providing support for doctoral work, and even more than this, for postgraduate programs, either in France or with the participation of French specialists in Argentina, depending on specific needs.

The other fundamental aspect of this cooperation is represented by the sponsoring of the meeting between Argentine and French scientists and businessmen, from which we hope joint enterprises will grow, with the support of scientists from both countries, which will enrich the business-research link in which both Argentina and France are interested. We have already learned a great deal from France in this area. We expect that this process will entail an effective incorporation of technology, which, in the conditions programmed, should be productively absorbed and compounded by our manufacturing sector, even in areas other than this specific area.

And the final point of cooperation that we would like to mention is related to the contribution that France makes with its example and its commitment to the field of scientific and technological activity. Despite the difference in scale, we do have points of contact in terms of productive and social structures and our scientific profiles. We are learning a great deal about the promotion and use of research. The seminar we held last year on this issue with the active support of MIDIST was for us an important starting point. It has yielded enormous results, including the style of this meeting, designed to offer one more contribution to the dialogue between research and production.

Franco-Argentine Cooperation Agreement

Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA in Spanish Aug 86 pp 50-51

[Text] Advanced Training Program; Sub-Program in Highway and Structural Engineering

Within the framework of the General Technical-Scientific Cooperation Agreement between France and Argentina, the well known French highway expert, engineer Raymond Sauterey, visited Argentina from 12 to 19 April 1986. He is now head of international services of SETRA [Roads and Highways Technical Studies Company] and is also a professor of highway materials at the National Highways and Bridges School in Paris.

This visit was connected with the advanced training program which the SECYT is coordinating within the framework of this agreement.

The program, which has been in progress since the start of our work, includes exchanges of researchers and university professors between the two nations, and sending Argentine fellowship holders to France for advanced work and studies (master's or doctoral levels).

The program includes France's support for the development of 15 fields of advanced training which are being offered by different Argentine universities, with the SECYT serving as a link and coordinator. To date, beginnings have

been made in nine of these fields. This means that a French specialist has visited Argentina to arrange for the final definition of the program and/or that fellowships have been awarded (see BOLETIN no 6, p 37). To the fields already listed, we can now add: statistics at the National University of San Luis; and economic and social history at the National University of Central Buenos Aires Province).

Under the sub-program mentioned in the title of this section, two young engineers from the Highway Laboratory of the IMAE [Institute of Applied Mechanics and Structures], Fernando Martinez and Silvia Angelone, are now working at the Central Highways and Bridges Laboratory in France, doing studies and advanced work in this field.

Universities or organizations wishing to take part in future activities related to missions of French experts in Argentina may contact: the Faculty of Exact Sciences and Engineering, Avenida Pellegrini 250 (2000) Rosario, which the SECYT has designated as the coordinator for the human resources training program in highway and structural engineering under the agreement with France.

During his visit Mr Sauterey, in addition to his activities at the National University of Rosario, spoke at the National Highways Division in Buenos Aires and in the city of Santa Fe; there, his talk was co-sponsored by Districts 7 and 17 of the National Highways System, by the Provincial Highways Division of Santa Fe and Entre Rios, and by the Engineers Associations of the two provinces.

In Rosario and in the Highway Engineering Area, Mr Sauterey held working sessions with the teaching staff, researchers and fellowship students of the Transportation Institute and the Highway Laboratory of the IMAE, and he also gave a short intensive course on highway materials, which was attended by 80 professionals and technicians from various parts of Argentina.

Cooperation with Sweden

Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA in Spanish Aug 86 p 51

[Text] During the first week in April, a delegation of Swedish specialists accompanied by seven Uruguayan scientists visited Argentina, part of Sweden's cooperation program with both Uruguay and Argentina.

The presence of this delegation continued the activities begun in August 1985 by Dr Ganuza, the representative to Latin America of SAREC [Swedish Cooperation Agency] (for details, see PNB [National Biotechnology Program] Bulletin no 1). The purpose of this visit is to speak with their Argentine peers, to visit laboratories, and to prepare specific proposals to be submitted to the executive board of the Swedish organization for approval.

The cooperation program--and therefore the theme of the discussions between the Argentine and Swedish specialists at this time—includes joint research programs in biotechnology related to health (respiratory diseases, diarrheas, Chagas' disease (diagnosis, control, and prevention) and biotechnology for the agricultural sector.

The Argentine institutions involved in this program are: the Institute of Biochemical Research, Campomar Foundation, CNIA of the INTA, CEVAN, CEFAPRIN, "C. Malbran" Microbiology Institute, "Fatala Chaben" National Institute for Diagnosis and Research of Chagas' Disease; Department of Microbiology, Parasitology, and Immunology of the UBA [University of Buenos Aires), Children's Hospital Virology Laboratory, Bio Sidus Laboratory.

The Swedish participants are: SAREC, Department of Microbiology and Department of Genetics of the Biomedical Center of the University of Uppsala, Department of Microbiology of the Faculty of Agriculture of the University of Uppsala, Departments of Parasitology and Microbiology of the State Bacteriology Laboratory-Stockholm, Department of Microbiology of the University of Goteborg, and the Department of Immunology-Karolinsk Institute of Stockhom.

The Uruguayan participants are: the Department of Chemistry, Medicine, and Agronomy of the University of the Republic.

Dr Cesar Milstein's Visit

Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA in Spanish Aug 86 p 52

[Text] Dr Milstein visited Argentina as a guest of SECYT's National Biotechnology Program from 17 to 28 March.

During his activities specifically related to the PNB, Dr Milstein met with the executive secretaries and members of the advisory committee, at which time they exchanged information and opinions on the program's operation.

During his stay, he visited a number of laboratories and research centers, establishing contacts and exchanging ideas with Argentine scientists working in different areas of the biochemical and biological sciences, and familiarizing himself with various projects now underway.

During his stay in Argentina, the PNB sponsored a conference on monoclonal antibodies, held in the Auditorium of the National Pediatrics Hospital. Dr Milstein gave the opening speech at this conference and took an active part in the presentations made by Argentine scientists and in the discussions of the conclusions.

On 20 March he gave a speech entitled "Anatomy of an Immune Response" in the Auditorium of the Biochemical Research Institute. At that time, he was awarded a diploma conferring him membership in the Academy of Sciences of Argentina.

Visit of UNIDO Official

Buenos Aires BOLETIN DE LA SECRETARIA DE CIENCIA Y TECNICA in Spanish Aug 86 p 52

[Text] Dr Wafa Kamel, head of UNIDO's [United Nations Industrial Development Organization] technology transfer section, visited Argentina from 23 to 28 May in order to consider the possibilities for future cooperation between Argentina and UNIDO and to evaluate the future of the CIIGB [International Genetic Engineering and Biotechnology Center] and Argentina's participation in its activities.

Dr Kamel met with officials of the SECYT and representatives of the PNB, and visited laboratories in Buenos Aires and in San Miguel de Tucuman.

Some results of his visit to Argentina were:

a. Formal definition of a proposed project: "Improvement of starter cultures for dairy industries through a joint cooperative r and d program";

b. Formal definition of a proposal for a 2-year training program in plant breeding for professionals in this field;

c. Up-dating of information available on the status of work designed to establish the CIIGB.

On the final point, we should add that in the week from 16 to 20 June, the eighth meeting of the preparatory committee for the establishment of the CIIGB was held in Vienna, Austria. At that meeting, Argentina was represented by Dr Jose L. La Torre.

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